ELECTRICAL WEST

GIRD

"IF a man would become a painter, navigator or architect, it is not enough that he be advised to be one, that he is convinced by the arguments of his advisor that it would be for his *advantage* to be one, and that he *resolves* to be one; but he must also be taught the principles of the art, be shown all the methods of working and acquire the habit of using properly all the instruments."—Benjamin Franklin.

SO it is, we are convinced, with every individual in the electrical industry. You are in this business because of the advantages it offers you. You are resolved to make the most of your opportunities.

ELECTRICAL WEST purposes to be one of the instruments by which this resolution may become a concrete accomplishment. Irrespective of your position or duties in this business you will be interested in the message on page 13.

OCTOBER 1934

McGraw-Hill Company of California
TWENTY-FIVE CENTS PER COPY

All in Favor of COOPERATION

October rounds out a year of close and effective cooperation between Southern California Edison Company and retail merchants of electrical appliances throughout the area it serves.

A year of determined, continuous assault against the "buying blockade" built up in three years of business stagnation. But a year which saw that barrier forced —and a return on the part of a large share of the public to normal buying habits.

This twelve-months' plan was developed in a series of carefully-planned sales drives, supported by intensive advertising and merchandising campaigns. Edison representatives in the field worked in close promotional cooperation with dealers. The largest expenditure in Edison history backed this big program.

Edison firmly believes that the shortest route to prosperity for all concerned lies in a continuation of this cooperative effort. On the threshold of another business year the Company plans to carry on its vigorous support of merchants in Edison territory.

Southern California Edison

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

NRA Graphic Arts Code No. 4-611

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ELECTRICAL WEST

With which are consolidated the "Electrical Journal," the "Journal of Electricity, Power and Gas," and the "Journal of Electricity."

ESTABLISHED 1887

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▼

• EVERYONE in the electrical industry will find features and services of paramount interest in this newly designed ELECTRICAL WEST. To every reader we recommend "The Science of Politics" because in this day of political encroachment and scatter-brained legislative suggestions, voting requires intelligent study and thought if our businesses, jobs and even personal freedom are not to be jeopardized.

• JOHN P. COGHLAN tells in "What They Will Learn" some of the things Washington and the critics of the industry will find out when the Federal Power Commission finishes its survey of light and power companies.

• MANUFACTURERS and engineers will profit from the finding set forth in this month's Engineering Symposium which deals with "sludge formation in insulating oils."

• WHOEVER sells electrical appliances of any character will gain in ideas of value from the new section, "Cooperation on Parade." Here are the latest developments in cooperative merchandising, the story of Salt Lake City's successful modernization exposition and Denver's new Electric Institute.

• AGRICULTURE is one of the West's major basic industries and one potentially fruitful of new load and apparatus business. How electrical service may be extended to help the farmer, build business and develop good will is discussed in "Rural Load Building."

• EVERY WESTERN UNIVERSITY has agreed to contribute to a new feature, "In the Realm of Science," which will present purely scientific developments affecting the electrical industry. This month Stanford University's new illumination laboratory and testing facilities are described.

• "SIGNIFICANT TRENDS" is the heading of a new section which will treat briefly of latest developments in electrical construction, in lighting, in load-building, and in engineering affecting the Far West.

• CONTRACTORS will find latest code news in "Contractors Code in Operation." Coordination of the various groups in the construction industry and joint operation of bid depositories, reported this month, will make for economical distribution of code costs.

• MOST IMPORTANT NEWS of the month is the announcement by the Pacific Coast Electrical Association of plans for two conclaves in November and a program which involves a series of eight prize awards. Major industry problems — sales, merchandising and engineering — will form the basis for a series of prize papers.

Are they getting
BETTER LIGHT — BETTER SIGHT?

. . . Not Unless the Voltage Is Right

ARE the lamps you helped to place in thousands of homes during the recent campaign living up to your promise of better sight? Or are they underfed — dragging out a dim, inefficient existence — producing no adequate return for you or the consumer?

With the end of daylight saving and the return to standard time, the problem of voltage regulation becomes increasingly important. More light means more load and more need for regulators.

See that your customers **get** "Better Light . . . Better Sight." Take advantage of the increased profits and improved customer relations which result from better voltage.

Why not discuss your regulation problems with the G-E representative who contacts you? He will be glad to give you his assistance. General Electric Company, Schenectady, N. Y.

THERE'S REVENUE IN REGULATORS

350-106

GENERAL ELECTRIC

THERE is hardly a type of rubber-insulated wire or cable which Roebling does not make.

Rubber-insulated and Braided Wires and Cables: Code; Intermediate; 30% and 40% Performance; 35% and 40% Performite. Plain Rubber 60% Sheath Power Cable; 40% and 60% Sheath Flexible Cords. Parkway, Service, Mining, Welding, and Control Cables; Tree Wire.

These will give you a fair idea of the completeness of the Roebling Line.

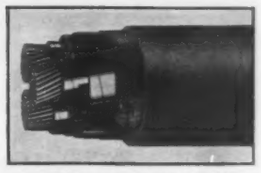
They are made in a wide range of sizes and voltages. Armors:—steel, zinc, or bronze tape, or round steel wire.

Your inquiry would be most welcome and we would be glad to send you our complete wire and cable catalog.

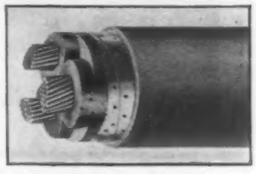
MANY OTHER TYPES

Power Cables: Paper; Cambric; Rubber » Station Cables » Slow Burning Wires and Cables » Weatherproof Wires and Cables » Submarine Cables » Portable Cords » Fixture Wire » Magnet Wire » And a wide variety of other wires and cables.

JOHN A. ROEBLING'S SONS CO. OF CALIF.
San Francisco • Los Angeles • Seattle • Portland



Roebling Varnished Cambric Insulated Cable



Roebling Paper Insulated Cable

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING

ARVIN FAN-FORCED ELECTRIC HEATERS

EVERY HOME NEEDS ONE... FOR BATHROOM, NURSERY, BEDROOM... AND OTHER COLD SPOTS • AND FOR OFFICES, STORES, CAMPS

No. 100 STANDARD $5.95

THEY SELL FAST

Arvin Fan-Forced Electric Heaters approved by Good Housekeeping Institute.. Underwriters' Laboratories

● It's because they serve so many needs—because they are so efficient and attractive! And right now is the time they start moving in big-profit volume.

People need quick heat in bathrooms, bedrooms, offices and a score of other places—and the Arvin gives them exactly what they want. These remarkable heaters plug in at any 110 A.C. socket and send out an immediate flow of fresh circulating warmth. Not blistering, dangerous heat, but steady, safe, fast-traveling June breeze.

Arvin consumer advertising is appearing in leading national magazines now. Order your stock in quickly and you'll make money now and all through the winter and spring. Call your Arvin jobber or mail the coupon below.

No. 100 Standard. Operates on 110 to 125 volts, alternating current, 50 to 60 cycles. Uses about 9½ amps. at 110 volts. Size: 9½″ x 5″ at base. Height, 11″. Weight, net 6¼ lbs. Green morocco finish.

No. 200 DELUXE $7.95

No. 200 DeLuxe. Operates on 110 to 125 volts, alternating current, 50 to 60 cycles. Uses 11 amps. at 110 volts. Size: 10″ x 5½″ at base. Height, 13″. Weight, net 9 lbs. Beautiful and permanent green morocco finish.

Noblitt-Sparks Industries, Inc., Columbus, Indiana
Please send full information about Arvin Fan-Forced Electric Heaters—the complete advertising program—and the name of a nearby Arvin jobber.

Name.....

Address.....

California Representative: E. J. JORDAN, 316 Commercial Street, Los Angeles

Frigidaire has never believed in half-way measures and never will.

That's why General Motors has spent millions of dollars in research that Frigidaire may continue to be known as the leading product of its kind. That's why millions of dollars have been invested in new plants and equipment that each Frigidaire may be as nearly perfect as it can be made. That's why the vast purchasing power and the engineering skill of General Motors have been called upon to make Frigidaire, in every sense, a true General Motors value.

As a result, Frigidaire today enjoys a reputation that is clearly reflected in Frigidaire sales. Aggressive in its policy of product improvement—aggressive in its advertising and merchandising methods—Frigidaire has steadily strengthened its position in the industry while company after company has come into the business and gone out again.

Frigidaire's two-fisted leadership—in quality—in value—and in sales—has won the approval of the foremost Public Utility Companies of the country. These companies have found that Frigidaire is the electric refrigerator that sells easily and stays sold—that builds real profits for their merchandising departments.

Frigidaire's sales program for 1935 is being formulated now.

It will be the most comprehensive in the company's history. It will embody new ideas and plans of the greatest importance to every man interested in the profits to be made from the sale of electric refrigerators.

If you, too, like General Motors, have "an eye to the future—an ear to the ground," it will pay you to get all the facts about Frigidaire's 1935 sales program. Write to Frigidaire Corp., Subsidiary of General Motors Corp., Dayton, O.

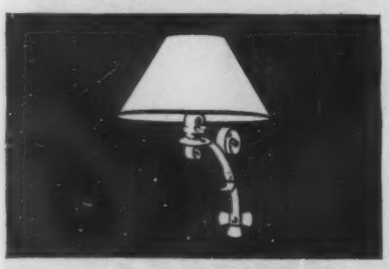
Frigidaire

A PRODUCT OF GENERAL MOTORS

THE WORLD'S MOST POPULAR ELECTRIC REFRIGERATOR

STUDY LAMP...
Should mean $3.00 in estimated annual revenue.

INDIRECT PORTABLE...
Should mean $4.50 in estimated annual revenue.



WALL PORTABLE...
Should mean $1.50 in estimated annual revenue.

KITCHEN UNIT...
Should yield $3.00 in estimated annual revenue.

PLANT LIGHT...
An example of alternative to kitchen unit.

BETTER LIGHT • BETTER SIGHT

These new lamps will put teeth in your lighting program

A YEAR AGO when a customer came in to buy a lamp, there was no urge to sell her a special type of lamp suited to her seeing needs. Today, thanks to the Science of Seeing which prescribes certain lamp types for specific visual jobs, you've got a complete new line of lamps to interest your customer. And backed by the concerted advertising of Better Light-Better Sight, these lamps will be in demand because they fill a definite need. Moreover, they are important to you because of their added load-building possibilities.

That's why it is so important for your lighting director to see that every retailer stocks them . . . to publicize them in every possible way . . . and that he keys your promotion to take advantage of the barrage of national advertising on Better Light-Better Sight.

The increased annual revenue that may be expected from each lamp type, including replacement wattage, has been estimated as follows:

TYPE	WATTAGE	PERCENTAGE OF METERS THAT SHOULD BUY	ESTIMATED ANNUAL REVENUE*
Study and Reading	100	5%	$3.00
Indirect Portable	480	3%	4.50
Wall Portable	60	10%	1.50
Kitchen Unit or Alternative	100	3%	3.00

* *At average rates and estimated burning hours*

WRITE FOR FURTHER DETAILS

The General Electric Company has invested a great deal of man-power and money to discover at first hand the most practical methods of developing lighting markets in accordance with the new Science of Seeing. Out of this research have come proven helps to assist you in taking full advantage of the Better Light-Better Sight program. Write to your source of MAZDA lamp supply for any additional information about *printed material and sales aids* which you may be interested in getting.

GENERAL GE

BETTER LIGHT BETTER SIGHT

BETTER LIGHT • BETTER SIGHT

A picture story of what's happening on the lighting front

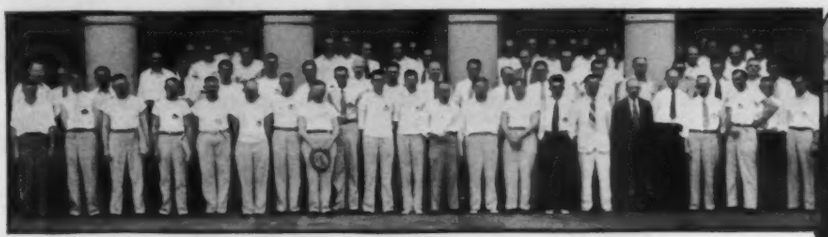
BIG things are happening on the Lighting Front! The news pictures on this page show some of this activity . . . Utilities have and are sending representatives to Nela Park to attend lighting sales courses . . . they have already purchased hundreds of lighting demonstration kits for commercial and home lighting purposes . . . they are using the proven sales aids and printed material prepared by General Electric to assist them in taking full advantage of the Better Light-Better Sight program. Their representatives are attending the sales courses based on the new Science of Seeing and being conducted by General Electric Lighting Sales Institute in 51 key cities during September, October, and November.

The Sight-Light Demonstrator is a simple test device for determining the amount of light needed for comfortable, easy seeing. It will play an important part in many Better Light-Better Sight programs

A Commercial-Industrial School comprising lighting salesmen representing key utilities . . . at Nela Park recently.

Representatives of leading utilities attend a recent lighting sales course at Nela Park.

Lighting companies have already purchased approximately 600 demonstration kits, perfected by General Electric, for commercial and home use.



Nela Park had the pleasure of discussing Better Light-Better Sight plans with this group of Electric Bond & Share executives.

This group of Middle West executives, guests at Nela Park, study commercial lighting sales.

ELECTRIC

BETTER LIGHT BETTER SIGHT

A whirlwind windy

Be Modern is the slogan with which Hotpoint is thumping up Fall range business. This timely theme is aimed to tie up with the Federal Housing Administration's promotion for home modernizing. It is designed to help Hotpoint dealers and utilities get the utmost benefits from the Federal Housing Administration activity.

Hotpoint's Fall and Christmas campaigns (both utilizing the modernization theme) are comprehensive and dynamic. They are readily adaptable to conditions in your own territory, and will enable you to make a whirlwind finish to the *Big Range Year* which we predicted at the beginning of 1934. Consumer acceptance for electric cookery has increased this year by leaps and bounds. It continues to surge forward with increased speed. Sales of Electric Ranges have increased in proportion.

Hotpoint Offers Full Cooperation— Product · Price · Plans

With the Hotpoint line, you can explore every merchandising possibility to the limit. Here are ranges which enjoy the highest respect of housewives, models with beauty which enchants the most esthetic; practical features (headed by Calrod, the new hi-speed heating unit) which excite the hardest headed buyer. And Hotpoint gives you even more—

Price . . . the weapon which rounds-up sales. The new *Triumph,* a beautiful, full capacity range, is a price leader for you that can be counted upon to make new friends and to run up a tidy sales volume.

Plans . . . Every idea essential to a successful range sales campaign has been included in Hotpoint's Fall and Christmas plans. We are ringing the "Be Modern" bell with Fall activity. The "Cut Loose" *Sales Contest* for retail people is timely, complete and adaptable to your individual activities. Advertising for newspapers, direct mail and outdoor postings, hits a new high for a coordinated program. All of these activities lead logically and cumulatively to the Christmas campaign featuring the famous slogan, "What Mother Really Wants."

To help you in a whirlwind finish, Hotpoint offers you, in addition to these foregoing features, the services of trained range specialists and home economists.

We urge you to get in touch with the Hotpoint District Representative nearest you and ask him to show you the wealth of material which makes up this energetic program.

EDISON GENERAL ELECTRIC APPLIANCE CO., INC.
5612 West Taylor Street · Chicago, Illinois

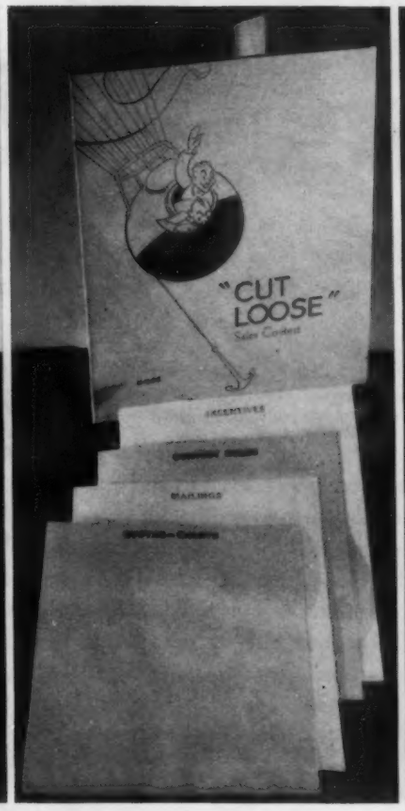
THE TRIUMPH, Hotpoint's new price leader, abounds in quality, style, capacity. It has Hotpoint features never before offered in a range of such low price.

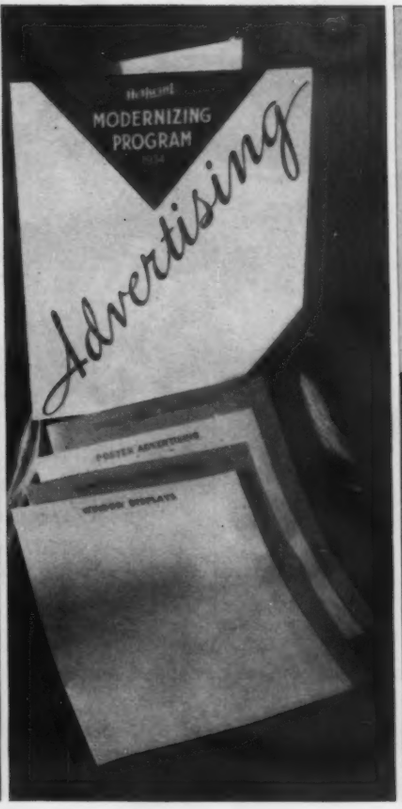
BE MODERN

Those who take Electric Range selling seriously realize that the future of this great business rests on a speedy, long-lived, dependable, enclosed unit. Hotpoint Calrod is that unit. The popular swing to this amazing hi-speed unit, growing in volume each year, proves it.

to a BIG RANGE year

HOTPOINT'S FALL AND CHRISTMAS CAMPAIGNS WILL HELP YOU!





Hotpoint's Modernizing Program

★ is the title of the Fall Plan Book. The novel indexing of subjects in this comprehensive portfolio enables the advertising, merchandising and sales managers to select, at a glance, the folders covering various activities. This portfolio is crammed with interesting sample material and suggestions for its use.

"Cut Loose" Sales Contest

★ employs a timely and modern theme — a trip to the stratosphere. Complete suggestions for operating a lively retail contest readily adapted to your own conditions are contained in this portfolio. Neatly classified in folders are various branches of sales contest activities: incentives, contest rules, mailings, quotas, charts, etc.

Advertising Campaigns and Helps

★ A fine portfolio for the advertising department. It contains not only specimens of Hotpoint's clever material, but suggestions to the advertising department for adapting such material to your own needs. Different branches of the advertising are held in separate folders, spotted at a glance by the legible indexing.

Christmas Campaigning

★ for a whirlwind finish can be augmented by the Hotpoint Christmas campaign portfolio — "What Mother Really Wants." These plans are designed to bring the year's activities into sharper focus. Like other Hotpoint portfolios, the Christmas folder is clearly indexed, contains sample material and suggestions

Hotpoint ELECTRIC RANGES & WATER HEATERS • •

PORTRAIT OF YOUR BEST CUSTOMER!

Sell him these

Make Santa Claus work for you. A large percentage of his Christmas gifts this year can be electrical gifts—providing *you* sell them to the gift-givers. Graybar can help you in your selling job by providing a varied line of attractive and up-to-date electrical appliances. Appliances from Graybar are dependable, *quality* appliances. They help make satisfied customers—and more sales in the future. They are backed by a reputation for quality that goes back 65 years to 1869.

IMPORTANT ANNOUNCEMENT TO DEALERS!

A NEW Graybar appliance sales policy is now in effect. Appliances are now being sold under manufacturers' trade names. The Graybar tag will identify them as bearing Graybar's seal of approval. Graybar policies of "living" profits for dealers will be continued. Finally, new and complete Graybar sales promotion plans have been developed to help you boost sales volume.

GraybaR

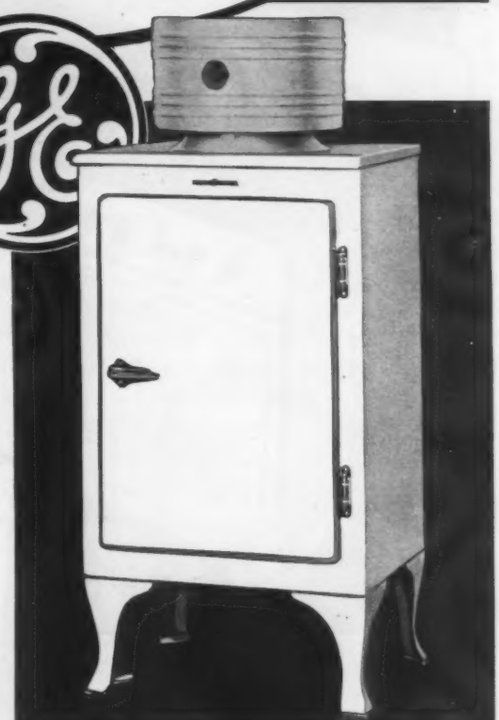
OFFICES IN 74 PRINCIPAL CITIES. EXECUTIVE OFFICES, GRAYBAR BLDG., NEW YORK

An amazing story of FAITHFUL PERFORMANCE!

*** 97% of G-E Refrigerators in use 5 years are still giving satisfactory service to their original owners... an unparalleled record of customer satisfaction!**

WE ARE CO-OPERATING BETTER HOUSING PROGRAM

** From a survey made this year in 10 principal cities by R. L. Polk & Co. It does not include those General Electric Refrigerators still giving satisfactory service but which have been disposed of by their original owners.*



SATISFIED CUSTOMERS are the refrigerator retailer's greatest business asset. The unparalleled performance record of General Electric refrigerators is one of the chief reasons for the success enjoyed by G-E dealers. The famous Monitor Top sealed-in-steel mechanism has made this record possible. It is unmatched for dependable, trouble-free service. It has earned its right to the 5 years' protection against failure which G-E now gives for $5—only $1 a year.

Customer satisfaction gained from faithful year-after-year performance means two vital things to G-E retailers. First it means more and easier sales. Second it means protection to net profits because servicing is reduced to the absolute minimum. That is why the G-E franchise is so much sought after. If you are not already a G-E dealer, you are invited to share in the preferred profits made possible through the medium of satisfied G-E refrigerator users. Write or wire to the nearest address below, for details of the G-E franchise.

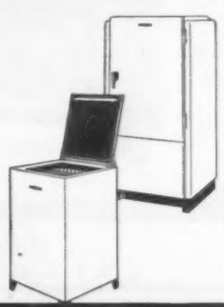
GENERAL ELECTRIC SUPPLY CORP., Portland • Seattle • Butte • Salt Lake City
VALLEY ELECTRICAL SUPPLY CO., Fresno • GEO. T. BAUDER CO., San Diego
ELECTRIC APPLIANCES, INC., San Francisco
GEO. BELSEY CO. Ltd., Los Angeles • B. K. SWEENEY, Inc., Denver

GENERAL ELECTRIC
ALL-STEEL REFRIGERATORS

A G-E REFRIGERATOR FOR EVERY MARKET!

● With the Monitor Top, Flat-top and Liftop models General Electric dealers can offer a refrigerator for every size family, every income!

Prices as low as . . . $77.50 plus freight



"4 in line" ... another INNOVATION for the Advancement of Electric Cookery by Monarch ELECTRIC

F75G-4T

F55G

75G-3T

MONARCH'S *New* AND EXCLUSIVE UNIT ARRANGEMENT MEANS KOOLER KOOKING

Not merely an innovation for the sake of something new... but another Monarch contribution to Electric Cookery backed by sound reason.

Placing the units in a line at the rear of the cooking top accomplishes three worthwhile objects. It makes all units accessible to the operator without reaching over other utensils. It gives a spacious work-table directly in front of each unit. It reduces heat at the switch assembly, with increased circulation above the oven top and assures Kooler Kooking for the user.

Will it sell? Consider its remarkable "eye value"... its individual design ... its practical convenience ... and the fact that this new unit arrangement is offered in a wide price range, from the elaborate "hooded" F55G to the inexpensive "3-in-line" 75G ... Prices with photographs and detailed descriptions sent on request.

MALLEABLE IRON RANGE CO., 9105 Lake St., Beaver Dam, Wis.

G. A. LIESER
1218 17th Ave. No., Seattle

E. G. LUDWICK
2933 N. E. 24th Ave., Portland

GLENN L. BROWN
3515 Kempton Place, Oakland

ELECTRICAL WEST

[*Devoted to the economic production, transmission and distribution of electric power and its application to industry, commerce and the home in the Pacific Empire, and to the sale and distribution of electrical utilization devices, equipment and appliances in that territory.*]

October, 1934

•

A New Stride

FOR almost half a century Electrical West and its predecessor publications have served the electrical industry in the Far Western states. During that time changes in the industry itself, earthquake and fire, war, and yes, even economic depressions have dictated alterations in style, in name, in frequency of issue and in format. In every case the purpose has been the same—better to serve the industry in recording progress, in presenting facts to guide the thinking, in interpreting events, in contributing to the solution of problems.

Today there are new conditions in the industry. Public attitude is shifting. There are new problems. And, finally there is a new conception of the great opportunities that the future holds for electricity and the multi-branched industry fathered by this common bond. All these dictate that Electrical West change again.

SO WITH this issue we give you a new Electrical West, edited, written and printed in keeping with the fast pace of 1934. It is designed as a utilitarian instrument to lead, to sift, to interpret, to record. Using it, every organization and every individual may better accomplish his every day tasks and may profit to a greater degree than ever from the opportunities that the electrical industry holds for us all. It is aimed at the promotion of profitable industry sales, the development of intra-industry understanding and cooperation and the improvement of industry service.

Most important of the changes which will provide this greater service to our readers is that of style. Writing and reporting must pass a new and acid test: What is its significance to the industry in the territory which Electrical West serves? By integrating and interpreting events, facts and thinking to conform to this key question, every item in the magazine takes on new importance and new interest to all readers irrespective of their position or duties in the industry.

Supplementing this treatment are editorial services and features aimed specifically at industry groups and their problems, services nowhere else available. In this category fall such sections as Rural Load-Building, Contractors' Code Operation, In the Realm of Science, Engineering Symposium and Cooperation on Parade. Then, too, there are new contributors such as Electra's Husband and Bill Jones—who are real people, experts in the industry.

To help us perform the best possible industry editorial job, we have sought the counsel and guidance of a representative group of industry leaders who will comprise an Editorial Advisory Board.

THUS with new features, the expansion of established services, and more pages, Electrical West will strive to present an editorial service commensurate with the importance and future prospects of the electrical industry in the Far West. Our readers will be the judges of our performance. We believe in this industry. We are optimistic about its future. We look forward with confidence, accepting the challenge of the future with courage. We ask that you, our readers, share with us this optimism, this confidence and this courage, that all of us may prosper and succeed.

+ + + by Electra's Husband

The Science of Politics

THE old order changeth. Things are not what they used to be. Possibly they never were. We used to swear by the Fathers at Washington; now the tendency is to swear at them. Once we thought the Constitution meant what it said; now look at the old thing. We quoted Henry Clay, who said, "I would rather be right than be president." Poor old Henry! What would he think of the popular modern version, " I would rather be left and be president"?

Even the dictionary is haywire—and here we used to put our trust in it. Take this definition, for example:

POLITICS: The science of government.

If this definition could be preserved to us in pristine and academic purity, we would esteem the word highly and bow our heads humbly in the presence of those learned men who pursue the science, the politicians. But either Noah Webster and his successors have been serious-minded gentlemen who interpret word meanings in scholarly seclusion, or they are disciples of the Bugs Baer school of humor. For that definition is one of the dictionary's very few and very own belly-laughs.

Politics is the science of government? Hardly! It's the science of getting votes.

But please do not list it as an exact science. There are no rules. The political scientist, interested only in getting votes, doesn't care how he gets them. If you disbelieve this, mix yourself up in a political battle with high resolve to be ethical, which means to be a square guy. Then see how far you get. When it is all over and you meet yourself on the way back to consciousness, you will find yourself floundering about in the shadow of the eight-ball. And echoing in your ears will be the raucous and derisive laughter of your successful antagonist, who played the game on the catch-as-catch-can, no-holds-barred basis, with an unadulterated mayhem as one of the chief assets of offense. You can't win the square way, it would seem; and as you will not play any other way all you can do is to retire gracefully, lick your wounds, and renounce forever even the so-called privilege of voting. Some day, maybe, the public will realize that it has been gold-bricked, and that will mark your day of satisfaction.

We're not naming names, nor indulging in personalities, although we could do that without straining. And what a tale of chicanery, demagoguery and plain roguery we could unfold! But to pursue the subject impersonally, let us as a case in point consider the great Central Valley Water project in California, which with a ballyhoo that John Ringling might envy and about 30 per cent of the registered vote going to the polls, got itself passed last December. Bonneville, Grand Coulee or Casper-Alcova would serve as well were the facts dug out.

It's a capital offense to say a word against the C.V.W.P. Electra's Husband knows that. So he puts himself on record as declaring it a grand and glorious plan—for the politicians. He also knows that nobody who advocated it has ever told the truth about it; but half-truths, which are more pernicious than outright lies because they are harder to combat, were as numerous as Einstein's hair.

"The Federal government has promised us the funds!" they proclaimed. That, however, wasn't even a half-truth. It was pure fiction—well, not so pure, either.

"Show us the record," asked those who wanted really to know.

"So!" they sneered, "you're on the payroll of the power trust!" There is the clever answer. In the politician's creed, it is fatal to explain anything; just call the other fellow a louse and settle the argument right there.

Of course, the government had not promised any support whatever. But what matter that? "Get the votes!" said the politicians. "We'll wriggle out of it some way—but what we want now is votes! We'll put 35,000 men to work at once! We'll start this job within thirty days! Let's end unemployment! This great project will not cost California one penny! Power at cost for everybody! Anybody who says otherwise is a dirty name and besides he's being paid by the power trust out of its slush fund of a half million dollars! Long wave the banner of the free! *E pluribus unum!*"

No federal money has been obtained. The federal government has so far been decidedly lukewarm toward the project. The 35,000 men have not been put to work; in fact, not one man has been put to work, except perhaps a high-powered publicity man, although nine months have gone by. The "great slush fund," and an itemized statement of every nickel to tell the voters why this measure should be defeated was filed under oath, was not enough to pay for sending one piece of reading matter to one-half the voters in the state. But "slush fund" rolls well from the oratorical tongue and it's just as easy to say five hundred thousand dollars as one hundred thousand. Power companies may deny it, but who'll believe 'em? Why not say a million? It will get more votes!

But these are just the high spots, the obvious untruths broadcast by the political promoters of this measure, with the object of getting votes then—and later. Electra's Husband, being somewhat cynical out of his years and experience, confided to Electra just before that December election:

"Judging from their extravagant use of language and their recklessness with truth, I would opine that some of these loud-mouthed boys are about to become candidates for office."

"You're a suspicious old fossil!" jeered Electra, which shows how I stand at home.

But look at the record! And listen to the shouting! Really, one wonders what certain candidates would have used for an issue if work on the Water Project had really been started. It seems now that if you do not elect Mr. Hoople Sputz to be coroner, or constable, or congressman, you can never get the money to build this God-inspired undertaking. Had it been put under way, presumably each candidate, huffing and puffing from a chest poutered with self-importance, would have said with Brutus, "Alone I did it!"

Yet still they stick to the obvious fairy tales. Is there not one of them that dares to tell the whole truth? If so, let him answer this question:

If the Central Valley Water project is built, how much more than $170,000,000 will the people of California

have to pay before the $170,000,000 can begin to meet its bonds interest?

None of the *E pluribus unum* boys will answer; few have even thought that far, and fewer still would care anyhow. So figure it out for yourself. The income to meet interest, amortize the bonds and pay operating expenses is predicated upon the sale of every kilowatt-hour generated. But only 15 per cent of the output is primary power. Any honest engineer—unless of course he is hoping to land a job, which would justify mental reservations—will tell you that if each kilowatt-hour generated is sold there must be additional steam capacity of not less than 100,000 kilowatts. That's a matter of $40,000,000 or $45,000,000 for an investment not provided for now. But was item standby mentioned by the project's sponsors? Hardly. Trey, Blanche and Sweetheart of the howling political pack didn't even sniff at it. Why call attention to something that might cost votes? Part of the science of politics is knowing what not to talk about.

The people were led to believe that the Central Valley Water project would give them electricity so cheap that robots to do everything would be more common than hoboes who do nothing. But what they were promised was that their cheap and plenteous power should be delivered at Antioch, and nowhere else. And to the man in Stockton, let us say, that's as valuable as a bottle of Scotch in Glasgow.

How many more millions of dollars would have to be spent in transmission lines, substations, and distribution lines to deliver the electricity to the place where the consumer could use it? It has to be delivered, you know; one can't go to a well and carry it off in a bucket. But nobody ever referred to the steam plant, or the transmission lines, or the distribution systems. These would have to be built. They would bring the project's cost up around $300,000,000, which somebody would have to pay. Of course, that sounds like pin money in these days of billions, but it is a big price to make $170,000,000 self-supporting. Sh-h-h! If anything is said about that votes might be lost. Sh-h-h! The science of politics!

Having won at the polls by a campaign of such falsehood and misrepresentation that it would be laughable were it not such a sad commentary upon accepted political methods and morals, our political friends flocked to Washington to get the money. It was a joyride at the state's expense.

In Washington a story was told that we had not heard here at home. But even political chickens come home to roost. We learn that the reformed Socialist—or has he reformed?—who is now one of the leading candidates for California's most exalted office has joined with other self-constituted saviors of our commonwealth to paint a picture of California desolation and despair. A vast and fertile section, now having 400,000 population, is going back to dreary waste merely for want of water. The people of the San Joaquin are in dire straits. Cattle are perishing by thousands. Vineyards and orchards and alfalfa fields are withering; dismay, terror, hunger, hopelessness ride like the Four Horsemen from the Mokelumne river to the Tehachapi mountains.

The San Joaquin Valley really has about 400,000 population. But that means the whole valley, including the counties of San Joaquin, Stanislaus and Merced, none of which needs a drop of water, none of which can benefit in the least from the Central Valley project. Madera county needs water for development, but none for present cultivation. Fresno county can use water on some of its west side area; but the richest farming sections have ample water now. This applies also to Kings County. In none of these counties is lack of water threatening its welfare. The simple fact is that the Central Valley Water project contemplated water relief only for central Madera County and for certain parts of Tulare and Kern counties. The need in Tulare and Kern is real. Something should be done to relieve it. And if the voters of California want to take on a debt of $300,000,000 to accomplish that relief, I for one will not deny their right to do so.

But why shouldn't they have been told the truth? And why should the fertile, well watered counties of the northern San Joaquin Valley have to be paraded over the whole nation as being poverty-stricken, desolated, and in need of succor?

Why? So that somebody may get votes, Electra dear! The science of politics!

WE have talked often about the tremendous tax burden of this company because it's something big enough to talk about, and it vitally concerns you. We have shown what a factor the company's taxes are in supporting schools, city, county, state and other forms of government. But let us visualize for your benefit what our 1934 taxes really mean. The total we are called upon to pay is now placed at $2,000,000. This is $5,479.45 for every day in the year. As the hour hand moves from 2 o'clock to 3 o'clock this afternoon, and every other hour in the march of time, $228.31 is added to the cumulative figures—one hour's tax. The minute hand ticks off $3.80 every 60 seconds, night and day. In the face of such tax burdens isn't it remarkable that our domestic customers today pay on the average less than a third as much per kilowatt hour as they did in 1913?

Who will wind the clock if we are gone?

Frank M Gaughlen
PRESIDENT

PUGET SOUND POWER & LIGHT COMPANY

What They Will Learn

By JOHN P. COGHLAN
Second Vice-President and Assistant to the President, Pacific Gas and Electric Co.

REPORTS from Washington show that electric utilities on the West Coast are vigorously co-operating with the Federal Trade Commission in its nation-wide survey of power resources, and in its investigation of electric rates throughout the country.

This is as it should be. For out of the survey will come truths that will educate those in high places.

The survey will show just what factors enter into the development of power and into the making of rates. Fundamental facts will be listed and set down. Public men, writers and economists will read and learn.

They will learn that some utilities have ideal hydro-electric sites and low cost plants, close to their power markets; that others have to go far up into mountain ranges to construct high cost plants and build long transmission lines in order to reach cities and towns where their customers live and do business.

They will learn that some build their plants beside natural waterfalls, like Niagara, that flow on without end; that others have to build costly dams to store the waters of winter and expensive steam plants to standby in summer when winter waters have become exhausted or when dry winters have made storage impossible.

They will learn that one utility has a modern steam plant with cheap coal or oil for fuel; that another has to keep in operation an older and less efficient plant, and has to pay higher prices for fuel, coal or oil.

They will learn that one utility has put its lines underground at great expense while another has not.

They will learn that one serves a single city with homes and customers close together while another covers a widespread area with cities and towns tied in with farms, far apart and expensive to serve.

They will learn that unfriendly critics compare rates that cannot be compared; for example rates for power from a plant at Niagara Falls with rates in California. Yet at Niagara nature stores the water, creates a great waterfall and is so bountiful that dry years are unknown and steam standby plants unnecessary, while in California millions must be invested in dams and ditches; more millions in pipelines down mountain sides to make artificial falls and still more millions in steam plants to standby when there is no water in the mountains.

They will learn that privately owned utilities pay all kinds of taxes, Federal, state, county, city; some as much as 20 per cent of the gross while municipal enterprises pay none.

They will learn that the publicly owned systems take only the cream of the business, confining themselves to the cities and to high rate customers, while the privately owned utilities serve city and agricultural areas alike, taking the lean with the fat.

They will find that the average bill of the household user is only a few cents a day—less than the price of a package of cigarettes or a large loaf of bread, less than half the price of a movie ticket, and that the so-called light bill covers more than light—energy to operate radios, irons, toasters, refrigerators.

All this and more will come forth to educate public men, writers and economists, and through them the great public at large; not all at once of course, but bit by bit as the survey and investigation go on.

Rate schedules reported from one section will require comparisons with another. Power costs here will be measured with power costs there. Comparisons will bring out the facts and facts piled upon facts will tell the whole story.

Those who co-operate in developing the facts serve not their government alone—they serve themselves and the millions of utility investors whom they represent and whose property it is their duty to defend and protect.

Business Building Brainstorms + + +

[*What the Industry needs is a brainstorm to destroy the power surplus pest—Arthur Markwart, president, P.C.E.A.*]

Make Your Ideas Pay

Two Associations and Electrical West Plan to Reward Contributors of Real Business Building Ideas That Will Help the Industry Along the Road to Sales

"WHAT this industry needs more than anything else is material to stimulate sales activities. We want ideas, in no more detail than is essential." Thus writes a utility president to the editors. The same thought is expressed by Arthur H. Markwart, president of the P.C.E.A., who said in his inaugural message, "What the industry needs is a brainstorm to destroy the power surplus pest."

Using these quotations as a theme, ELECTRICAL WEST proposes to devote a section of each issue to the publication of ideas or brainstorms from any individual in the electrical industry which will aid in the stimulation of kilowatt-hour sales. Everyone in the industry has had ideas at one time or another for extending sales of power or appliances or apparatus. Here is an opportunity for expressing them with profit. ELECTRICAL WEST will pay $2.50 for each idea or suggestion considered worthy of publication by the editors.

In addition, all suggestions published during the six months from October 1, 1934, to April 1, 1935, will be eligible for $50 in awards to be given by the Pacific Coast Electrical Association. They will be judged by a committee consisting of the president of the association, the chairmen of the Business Development and Operating Economics Sections and the editor of ELECTRICAL WEST. The awards will be made solely upon the business building merit of the suggestion or idea and the opinion of the committee will be final. Three awards will be made: $25 to the person submitting the idea considered most worthwhile by the committee; $15 to the person submitting the next best suggestion and $10 to the person submitting the third best suggestion.

Suggestions should be limited to 400 words, preferably less. Composition does not matter, as the editors will put the material submitted into final shape for publication. Suggestions will be published over a *nom de plume* or pseudonym if desired, provided the author indicates that such is his or her wish. Already one individual in the industry to whom the plan has been explained has indicated a wish to have his suggestions published as coming from "Operator 79."

To indicate the wide variety of brainstorms that might qualify, two typical ones are published below. These are merely samples. If you have a "Business-Building Brainstorm," put it down on paper today and send it to the Editor, ELECTRICAL WEST, 883 Mission St., San Francisco, Calif.

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Samples

Why Not "Head of the House" Loans?

LOANS to owners of property, to modernize their homes or business buildings, are fine things for the building industry, and will do much to revive that business. But while the government is doing this, and making it easy for the Tennessee Valley people to get appliances, why wouldn't the idea work too, if carried to the rest of the country as follows:

Loans could be made, in special script form, for sums up to $200, at low rates of interest, to the approved, responsible head of every family in the United States, for the sole purpose of buying immediately goods or services to prime the economic engine—new clothes, household equipment, automobiles, radios, washers and ironers, ranges, refrigerators—everything that sadly needs replacement. Limit its availability to one year, and allow amortization to run ten years. Merchants would accept this special script in exchange for normal currency through their usual banking channels.

This would immediately start sound purchasing power at its very source, create markets, increase manufacturing, distribution and employment throughout the entire cycle by putting in motion the natural laws governing the exchange of services and goods. Why not? Credit extension of this kind to families of proved financial responsibility is just as practical as the same thing done to group enterprises or to businesses of responsibility.

The creation of the resultant business will automatically provide the means of earning the funds to amortize the loans. —W. K.

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Electrify the Electrolux

NOW that gas refrigerators no longer need to have a connection to the water mains, isn't there an opportunity to convert them all to electricity and make them really convenient to the user? For example, a small, removable electric heating element could be devised to be attached to the gas refrigerator in the place of the little gas flame that is now used. This would do away with the necessity of keeping the refrigerator in one place in the house all the time, attached rigidly to the gas main. Also it would be much safer, for no harm could result if there were an interruption of service.

These little attachments could easily be installed and would help in one way to increase the electric load and reduce the power surplus pest. Also, when the customers learned the true convenience of a really portable as well as safer refrigerator—using electric current instead of gas—they would become better prospects for electric ranges and other appliances.—Oscar Thompson.

Cooperation on Parade + + +

[*Forecast of forthcoming cooperative merchandising activities, and review of activities in progress or completed, a summary of cooperation at work throughout the West*]

Proves That Home Lighting Programs Do Pay

THAT the development of the home lighting market is a profitable activity is demonstrated in a convincing manner by the report of the San Joaquin Light & Power Corp. covering five months operation of its Home Lighting division. Established in March and built around the General Electric Company's home lighting plan, this division has achieved an impressive record in building both public relations and new load economically. As evidence of this, new revenue of $2.31 has been secured for each dollar expended in the new activity to date.

Several features of the operation of the new division are of interest. Much of its success is credited to the careful selection and thorough training of the five women who carry on the activity. Capable supervision of their training and work is provided by Mrs. Adele Randall who is experienced in utility work and conversant with all phases of the Nela Park home lighting plan.

To prepare the customer for a call by these home lighting specialists, letters were sent out to all domestic consumers announcing the new service and followed by a letter to selected groups of customers telling each that the representative would call during the week and requesting an interview.

The saleswomen are equipped with lamps, a sightmeter, and demonstration equipment to show the effectiveness of fixtures and shades on better lighting. The sightmeter plays an important part in the demonstration permitting recommendations for higher intensities to be made on the basis of accurate information. It is interesting to note that about 90 per cent of the new lighting load was added in the living room.

Assistance and recommendations are given for the selection of the proper equipment to improve the lighting but the lighting specialists do not sell either lamps or equipment. All this business is placed through the electrical dealer with whom the customer prefers to do business. In the case of lamps, the specialist will fill empty sockets and make exchanges of the proper size and kind of lamps and then will go to the dealer specified by the customer to replenish her supply. The dealer then bills the customer for the lamps thus "sold".

Results of the five months activity are summarized in the accompanying tabulation. The utility pays the salary and automobile expenses of the five saleswomen, the cost of the entire department averaging about $900 per month. Significant is the percentage of customers which have made the recommended changes and the trend toward acceptance of the complete recommendation as evidenced by the actual watts per home which were added.

The estimated annual revenue per kilowatt of lighting load is $25.55 based upon a two-hour daily usage of the new lighting on the second and third blocks of the company's rates. From the kilowatts added by the home lighting division in the past five months, the company estimates that it will receive $10,-305 of new annual revenue. A check of the meters of 98 customers who added new lighting revealed an increase of 6,608 kw.-hr. for 281 consumer months, an average of 282 kw.-hrs. increase per consumer per year. This checks closely with the estimated results.

Perhaps the most important figure in the table is the cost of obtaining this

A human, natural conversation put into an advertisement — an excellent sales talk suggestion for the contractor to use with consumers

...“this Yard Light is just the thing”
Mrs. Customer: Get that up as soon as you can, because we're through trying to be comfortable inside the house on these hot nights. My husband says it just can't be done.
Electrician: Right! But this yard light is just the thing. You'll be able to come outside at night and keep cool. With this you can read, eat and entertain in perfect comfort in your own yard.
Mrs. Customer: Will the bugs and insects bother us here as they do at my neighbor's?
Electrician: Not at all. I'll place this high enough so that there will be no bugs low enough to bother you.
Mrs. Customer: Won't that be too high to give enough light? My husband likes to read and he likes lots of light.
Electrician: He'll be able to read with ease. By the way, what do your electric bills run?
Mrs. Customer: About $4 a month. Why?
Electrician: Because under the New Lower Rate Offer of the power company, your bills entitle you to about 13 kilowatt-hours of extra electricity every month at no extra cost. With this 200-watt lamp, that much electricity will operate a yard light for 65 hours—three hours a night for 21 nights a month. Besides, this will help you qualify for the Lower Rate during the Summer months. San Joaquin Power is making comfort really pay!
MORE ELECTRICITY FOR YOUR DOLLAR
SAN JOAQUIN POWER
SAN JOAQUIN LIGHT AND POWER CORPORATION

Results of Home Lighting Sales Activities of San Joaquin Light & Power Corp., April-August, 1934

Month	Expense: Salary	Expense: Auto	Expense: Miscl.	Expense: Total	No. of Calls	No. of Call Backs	% Making Changes Found on Call Back	Recommended Addtl. Wattage	Average Watts Recom'd per Home	Avg. Watts Added per Home Found on Call Backs	Total Kw. Connected	% of Monthly Kw. Quota	% of Annual Quota	Cost/Kw. of Connected Load	Ann. Rev. of Load Connected $25.55/KW.	Rev. per Dollar of Sales Expense
April	$775	$100	$25	$900	224	42	74%	126,705	592	356	79.74	106.3	11.81	$11.29	$2,037.36	$2.26
May	775	100	25	900	265	19	90%	170,155	642	355	94.34	125.7	13.98	9.54	2,410.39	2.68
June	775	100	25	900	260	21	93%	159,200	612	275	92.56	123.4	13.71	9.72	2,364.91	2.63
July	775	100	25	900	168	14	93%	100,835	600	471	59.81	79.7	8.86	15.04	1,528.15	1.70
August ..	737	95	25	857	216	18	94%	121,960	564	544	76.89	102.5	11.39	11.15	1,964.69	2.29
Totals and Avgs.	$3,837	$495	$125	$4,457	1,133	114		678,855	599	381	403.34		59.7	$11.05	$10,305.49	$2.31

new revenue. For one dollar of sales expense, $2.31 of new revenue has been obtained. Considering that no capital investment is involved in serving this class of business, this is an excellent earning ratio. Another important result that is not shown in the figures at all is the good will and friendly feeling for the company that has been developed by this effort to improve lighting conditions in the homes of its customers.

Enhancing this fine record of the home lighting division is the fact that the activity was carried out during the most unfavorable period of the year for lighting sales. Long summer days and the vacation period retard rather than help a lighting campaign. However each specialist was able to average about two recommendations per day and during the fall it is expected that each will be able to average four per day. If past results are a criterion, this should increase the ratio between new revenue and dollar sales expense to three to one.

The success of the San Joaquin Light and Power Corp. is developing a market for power which heretofore has been untouched leads to but one conclusion: Better Light-Better Sight sales activity and the application of the science of seeing to the home constitute a program that can be profitably adopted by the entire industry not only for the revenue and new business it develops but also for its ability to render a valuable and appreciated service to its consumers.

Typical living room setting used at the electrical exposition in Fresno to demonstrate good lighting

Cooperative Activity Turned Toward Modernization

MODERNIZATION will dominate the stage in cooperative activities for northern California during October. The complete organization technique, found so successful in appliance selling by the Electric Appliance Society of Northern California, will be employed by the entire electrical industry in northern California to derive as much benefit as possible from the opportunities presented under the Federal Housing Act.

Originally intended to be the month for promoting the sale of radios, when radio distributors and dealers could not decide upon a program, the Pacific Gas and Electric Co. decided to convert its promotion budget for this campaign to the larger one of promoting home modernization and rehabilitation.

The movement started as an outgrowth of the committee of the construction industry. Charles A. Langlais, president, San Francisco Electrical Contractors Assn., called a general industry meeting and tentative plans were outlined. The Business Development Section of the P.C.E.A. was asked to assume leadership and Hugh Crawford, chairman of that section, and committees appointed by him immediately went to work.

Meanwhile a broad interpretation of the provisions of the housing act gave far greater hope to the proportion the electrical industry might enjoy from the movement. A ruling of Deputy Administrator Dean was to the effect that an electric range or a water heater, as a fixed appliance, attached to the electric mains and plumbing of the building could be considered an improvement to the property and would be eligible for a loan on the part of the home owners.

With details worked out, a meeting was called Sept. 21 at which the following program was outlined.

1. Sixty floor and window displays in Pacific Gas and Electric Co. offices during October will tie in with the modernization scheme showing specific examples of appliances which can be installed under provisions of the loaning procedure. A window display contest among dealers to tie in with the same program, general theme tie-in material to be furnished by the P. G. and E.

2. Full page in P. G. and E. Progress which is distributed to 500,000 consumers. Bill stickers on every domestic bill.

3. A sales bulletin describing the opportunities sent to the sales forces and employees of the utility company. Plans are under way for a similar pamphlet to be sent to the entire electrical trade.

4. Interviews with bankers to secure in their advertising mentioning of free wiring and purchase of appliances as permissible under the loaning procedure.

Most spectacular of all was the offer made to all dealers and contractors that the Pacific Gas and Electric Co. would pay one-third of the advertising costs of any advertising done by such dealers provided the advertising stressed the electrification possible under a housing act loan. Copy of advertising is to be submitted to the Pacific Gas and Electric Co. advertising department and the proof sheets from the newspaper are required. Billing is to be done by the newspaper, charging two-thirds of the cost of the ad to the dealer or contractor and one-third to the Pacific Gas and Electric Co.

A committee from the industry was organized to secure funds for a large cooperative advertisement from manufacturers and wholesalers. This advertising is to run over the name of the Pacific Coast Electrical Bureau and is to stress adequacy and the need for wiring modernization and tell what appliances can be purchased in compliance with the loans available to home owners on their own personal security.

Dining room of the model home showing the simple, modernistic semi-direct main lighting unit and the built-in decorative lighting effect in the corners of the room. Below is the living room demonstrating direct, indirect and concealed lighting. Note the decorative effects obtained by the translucent panels running from the floor to ceiling

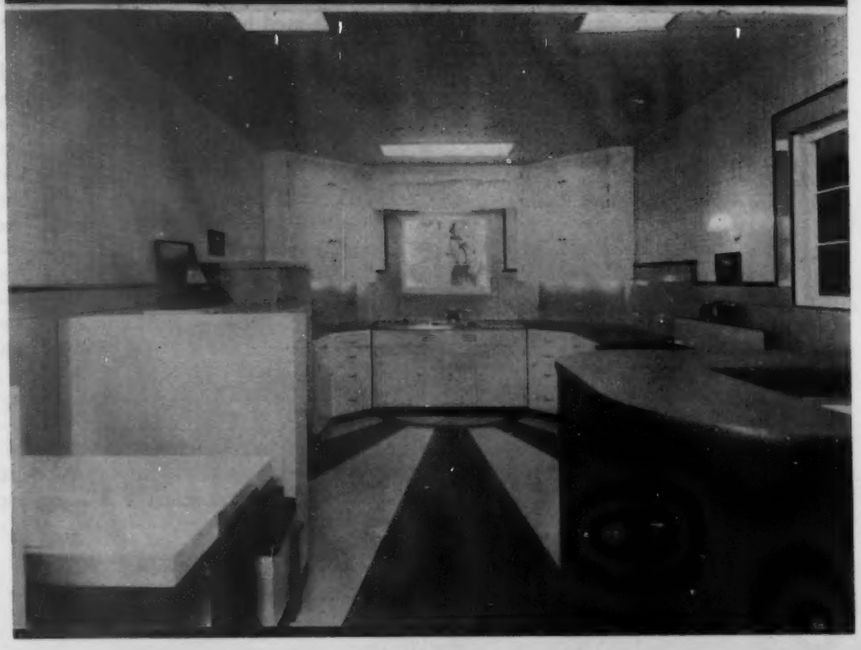
Salt Lake City Demonstrates Modernization

ELECTRICITY'S contributions to home comfort provided the theme for the Utah Power & Light Company's exhibition in Salt Lake City's Modernization Exposition. This exposition, the first to be held in the country to promote home modernization, was participated in by practically all building material and home furnishings organizations in the city. Its success can be appreciated from the fact that in six weeks almost 150,000 people were counted by the photo-cell electric counter at the entrance of the exhibits.

Building around the science of seeing, the Utah Power & Light Co. presented a comprehensive picture of lighting in all phases of home and commercial applications. Occupying approximately 2,700 sq. ft. of floor space, the exhibit included two complete houses, the rooms of which, furnished by local merchants, served as a means of demonstrating the various types of modern lighting arrangements as well as exhibit space for various electrical appliances which add to living comfort.

In addition, the commercial department of the company built a series of modernistic store fronts in which lighting was used to obtain unusual display features. Local business concerns used these as exhibit space for their displays.

To demonstrate the comforts of good lighting, a portion of the exhibit was given over to a light-sight booth in



Entrance to the model home also uses concealed lighting to welcome the visitor and call attention to the possibilities of garden lighting. At the bottom is the model electric kitchen. So great was the interest in this room, the company is preparing a portable electric kitchen with which a tour of its territory will be made

Proof that proper lighting adds to comfort was given by the glare chart (right) and lighting intensity box (left). Visitors thus were made conscious of the "science of seeing." Below are the model store fronts constructed to illustrate the use of light as a decorative and attention-gaining medium

which visitors could compare the ease of vision with various lighting intensities and select the illumination level best suited to each individual. Lighting specialists also were stationed in the various exhibition rooms to explain the lighting installation in each with reference both to its aid to seeing and its decorative possibilities.

The public's reception of this means of education in improved lighting was extremely gratifying to those responsible for the exhibit. Interest in the subject is so great that far-reaching results are expected from a continuation of the activity in the Better Light-Better Sight campaign through the Fall months.

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• HOME LIGHTING FEATURED — Home lighting will be the next subject taken up by the Home Electric Institute of the Air in southern California, according to Arthur Mayers, manager of the broadcasting feature. The Home Lighting Institute will be conducted along the same lines as former institutes with enrollment of listeners in the course and ten floor lamps will be offered as prizes to those who make the best mark in the examination conducted during the institute. The course is being modeled from the Science of Seeing book by M. Luckiesh. Mary Holmes will conduct the course.

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• JOIN FORCES — San Diego Electric Club and the Bureau of Radio and Electrical Appliances of San Diego County have worked out a reciprocity agreement whereby the members of the appliance bureau automatically become members of the electric club and attend its weekly luncheon meetings. This arrangement has proved mutually beneficial, since it brings to the engineering and manufacturing members contact with the sales and merchandising people of the community and brings to the latter a better understanding of the facilities required to serve their customers with electricity. The idea is one which might well be employed by other electric clubs and leagues in cooperation with appliance societies or bureaus.

Exterior of the model farm home. The interior depicts the comforts and pleasures of complete home electrification in isolated dwellings. At the bottom is a view of the co-operative building material exhibits in the exposition

Edison Pays Dealers' Advertising in Cooperative Campaign

A DARING experiment in cooperative advertising was carried through successfully by the Southern California Edison Co. in the cooperative refrigeration advertising campaign conducted during July and August.

The Electric Refrigeration Bureau, having relapsed in its organization form, a number of large distributors of refrigerators came to the Edison company to discuss a cooperative campaign during these months. A plan was worked out whereby each of these distributors was to submit his proposed July and August advertising program and appropriation to the Edison company. With the amount determined, the Edison company then asked these distributors and dealers to spend that same amount of advertising which normally they would spend in two months during the month of July alone and that the Edison company would pay for an equal amount of advertising in August. The name of the Edison company would not enter into the advertising. All ads would carry the dealer's or distributor's signature.

The result was a two-month barrage of advertising throughout the territory of Southern California Edison south of the Tehachapi which out-did any previous effort.

Only one difficulty was encountered. In its advertising placement, the Edison company spread its appropriation over its own regular list of newspapers which was larger than that provided for in the programs of the distributors. While this was of advantage to the distributors, a newspaper rivalry developed which took considerable argument to bring to a sane conclusion. Those papers favored by distributors were reluctant to share space in the second month of the campaign with their local rivals who during the first month did not receive any advertising. However, the entire matter was finally settled to everyone's satisfaction and this campaign's success was influential in the determination by Pacific Gas and Electric Co. to use the same technique in advertising the modernization program mentioned in another column.

Figures for August from 518 dealers showed sales of 2,295 refrigerators while in July the sales totaled 2,256 units.

In its valley districts, not served by the same distributors, Edison advertised in this manner, with dealer ads alongside. Together they dominated the page of papers running the ads.

USE THIS SPACE FOR DEALER TIE-UP ADS
Get it Use it Enjoy it NOW
LOW PRICES · EASY TERMS AT YOUR DEALER
BE SURE IT'S ELECTRIC
That Means It's FAST
An Electric Refrigerator Pays for Itself
ALL THAT FRUIT I BOUGHT SPOILED! JIM, WE'D SAVE MONEY WITH AN ELECTRIC REFRIGERATOR
DON'T 'COOK' THE COOK
Cool Meals Most Appetizing for Torrid Days
Why Wait?
SUITS ME NO USE THROWING MONEY AWAY LET'S GO DOWN AND PICK ONE OUT THERE'S NO SENSE WAITING ANY LONGER

In allotting the space to dealer advertising all the negotiations were carried on between the Edison company and the distributors, the distributors being responsible for the allocation of space to their own dealers.

Coincident with this advertising campaign Electric Home Institute of the Air carried on a cold cookery campaign. There were 2,500 enrollments for the course conducted by Mary Holmes.

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Economy Featured in Range Campaign

THE fall range campaign, a cooperative affair between electric range manufacturers and wholesalers and the Southern California Edison Co., was launched at a meeting in September. The campaign started Sept. 15 and is to run to Jan. 1. The campaign slogan is "Economy." No particular model of range is to be featured, each wholesaler arranging for his own campaign model and establishing his own price. Minimum down payment is $9.50 where the Edison company underwrites the contract on ranges selling for $130 or less. A 10 per cent down payment is required on ranges selling over $131.

To stimulate the sale of water heaters, these appliances will be accepted on the same contract with an additional $1 down payment when underwritten by the Edison company. Both range and water heater will be accepted on contracts running up to three years.

Experience has shown that the fundamental weakness in the sale of ranges where the utility does not itself merchandise ranges any more is the lack of trained men in the field on the part of the dealers. To assist in overcoming this, the company will inaugurate a series of short training schools for range salesmen. Dates and location are to be announced to dealers by dealer representatives. Wholesalers are to urge their dealers to obtain field salesmen and insist upon them attending these

Streamer copy which is part of the advertising lineage contracted for cooking schools, and run in other pages than that carrying the main ad.

Of interest to every woman who keeps house → Edison → *See page*

schools. Wholesalers are also to train dealer salesmen in the specific sales points of their own ranges. An effort will also be made to influence dealers to use electric ranges and water heaters in their own homes in order to get a first hand knowledge of operation and benefits to be derived from their use. Standard wiring and trade-in-allowances previously established by the company are to prevail.

In support of this campaign the Edison company has signed contracts with the Mogensen Co. and Western Features Enterprises to conduct a series of all-electric cooking schools in accordance with a prearranged schedule. Manufacturers and wholesalers will participate in these schools which will offer a unique service at a low cost and provide prospects for dealers from the demonstration and displays at the schools. Each dealer is to be provided with names and addresses of those who attend the schools together with make, type and age of present cooking equipment.

The advertising department has prepared a cooking school series of advertisements with the unique feature of running streamers included in the contract for 300 in. of space with the newspapers involved. A streamer is to run at the bottom of pages adjacent to that on which the cooking school advertising appears and points to the feature page. Such newspapers as do not run these streamers will lose 72 in. space from their contract. The advertisements are arranged for the insertion of the name of the demonstrator, the place and the time of the cooking school and the sponsorship by the paper. A follow-up ad a week after the school contains a closing message to direct those who attended the school to their dealers for the purchase of a range.

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• WATER HEATING is being studied by the Bureau of Power and Light since the inception of its one-cent rate. Already 200 water heaters have been placed on the consumers' lines and equipped with meters and time charts to determine what effect water heating load has on the peak of the system. Each unit in the water heater is being individually metered to determine whether the top unit comes on during the cooking peak in domestic use.

Like ranges, the water heaters are sold entirely through dealers. A large fall range and water heating advertising campaign is being planned by the Bureau to promote the sale of these appliances to the Los Angeles public. Dealers in that area will find this helpful in preparing the way for their salesmen.

Portlanders Cooperate in Lighting Drive

Since January 1 of this year, the Northwestern Electric Co., of Portland, has been making the most concerted effort in its history in the development of commercial and industrial lighting. The work comes under the sales bureau, headed by J. C. Plankinton, manager.

Promotional means being employed include newspaper advertising, direct mail advertising, numerous demonstrations and lectures at public gatherings throughout the territory and lighting equipment demonstrations made in vacant stores located in strategic places in the city of Portland.

But the most direct and result-producing effort is that represented by seven direct sales representatives of the company who do nothing but work up one street and down another and personally interview the 3000 odd commercial and industrial lighting prospects and customers on the company's list. They are studying each and every office building, service station, school, institution, factory, laundry, shop and so on, with a view to suggesting improvements in the lighting. Every man carries a sight meter, and there are several of the more elaborate lighting kits in use by some of them all the time.

The routine of these representatives is as follows: Wherever the least interest is aroused, the representative secures permission to make a comprehensive study of the lighting problem. When this is discussed in detail with the prospect, and the matter has advanced to the point of determining types of unit and costs, one of the related groups is called in. If the proposed installation is one involving additional wiring as well as lighting units, and electrical contractor is called in, the prospect being first asked to state his preference among the available contractors. If he has none, then the utility appoints one. If there is to be no additional wiring, then a fixture dealer is called in. In either case, the utility representative and the contractor or dealer prepare complete plans and work together in making the sale. At times, the lamp man has a part in it, as also has the lighting unit manufacturer's representative or the electrical wholesaler's representative.

J. C. Plankinton, sales manager whose crews ferret out lighting business for the trade at Portland

The thorough preparation of the field and building up of a background by the indirect methods, then relentless personal solicitation, and finally team work by the various interests involved to bring about a sale, are all acting to accomplish some quite remarkable results. Complete records have been kept since the first of the year, and with the end of 1934, when these are tabulated and analyzed, there will be a report on the whole subject that should be of uncommon interest.

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Laundry Sales Climb to "Stratosphere"

DRAMATIZING its Fall merchandising campaign with a hypothetical stratosphere flight by each district, the Pacific Power & Light Co. plans to capitalize on improved business conditions by aggressive selling. Home laundry appliances will be the nucleus of the promotional program which started Sept. 17 and will continue until Nov. 3. Electrical dealers throughout the territory are taking advantage of the general nature of the utility's advertising and other promotional material by tying in with this campaign to sell more washers and ironers.

During the program, each district of the Pacific Power & Light Co. competes against the rest in obtaining all types of new business. Progress is measured by the height to which the ballon representing each district rises into the stratosphere. Revenue-building appliances are graded in points, each district being given a quota for the campaign. In the stratosphere flight, 30,000 ft. represents 100 per cent of quota, prizes being awarded not only for the highest ascension but also for the district which reaches its quota first.

Also a part of the campaign is the Better Light-Better Sight program of the company. This phase of the promotional activity will center around the study and reading lamp, both dealers and company employees participating in the sale of this unit. For the latter, the company is offering a cash bonus ranging from $0.25 to $1.50 for lighting sales in addition to points which count in the strathosphere race.

First Institute of West in Denver

DENVER'S electrical industry has the first Electric Institute west of Cleveland, created by the Public Service company of Colorado at a cost in excess of $40,000. It will serve as the focal point of industry selling, as a display center for all that is new electrically and, finally, as a public meeting place for industry groups as well as for clubs and similar organizations.

Purpose is explained in a statement by Guy W. Faller, vice-president and general manager of the Public Service Company, which is handed to every visitor: "This Institute, the first and only one of its kind in the West, will be fully realized if you will accept it as YOURS—a place where you and your friends may feel free to come for discussion and consultation on the better uses of electricity in the home. . . "

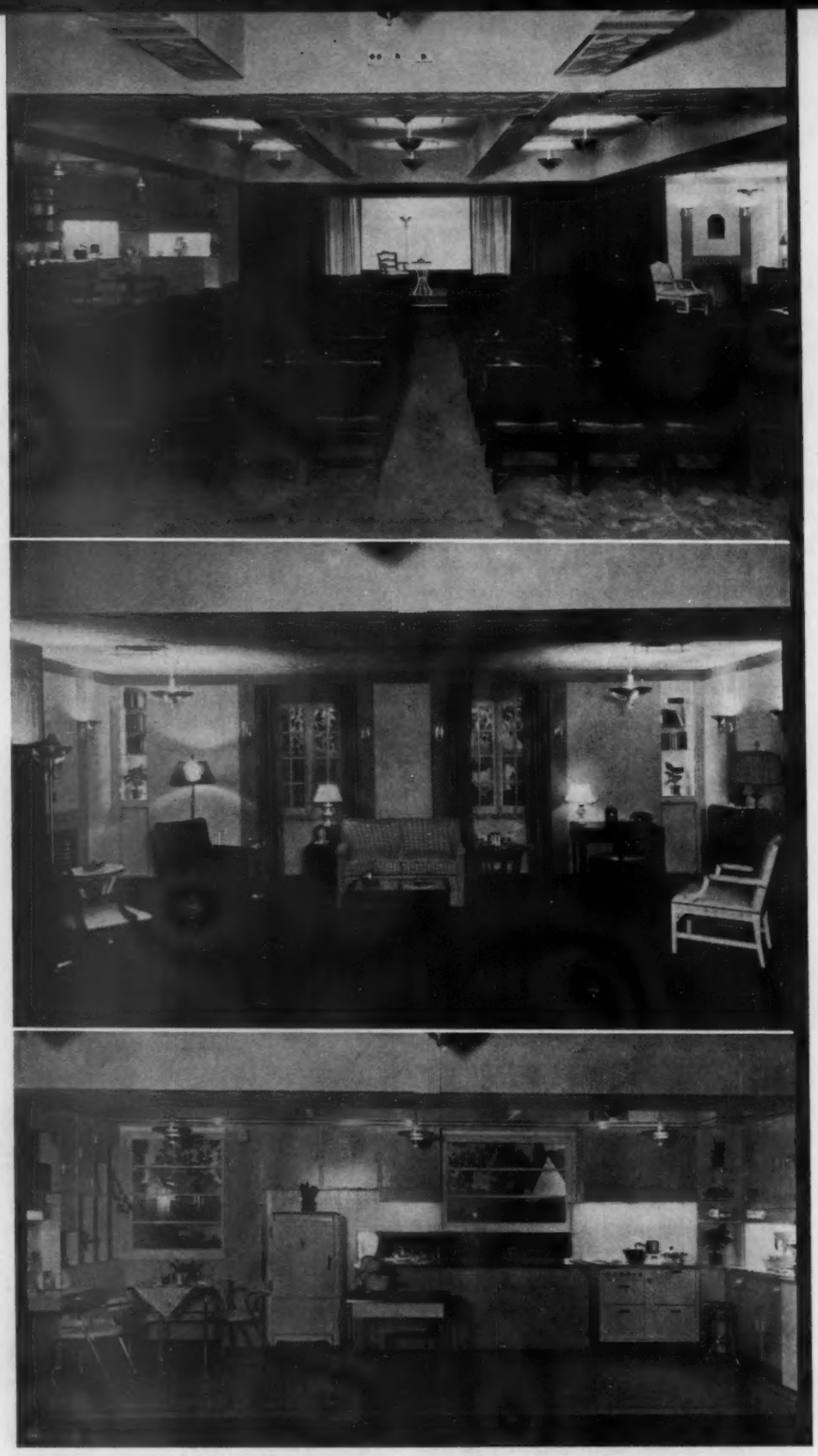
To it contractors may bring prospects for better lighting jobs, dealers may bring customers for new appliances; architects clients interested in modern homes and interior decorators prospects for ideas on home interiors. It was conceived and will be operated as a cooperative undertaking for passing on to the customer the benefits and conveniences that electricity offers.

Entrance to the Institute is through the company's sales floor which is lighted indirectly by a complete new installation which, in itself is a commercial lighting exhibit. The visitor passes successively by the Better Light-Better Sight section with its displays of old and new electric lamps. Next is a typical living room, modern in every respect with built-in illuminated book cases and up-to-date lighting. Then there is a stage on which during the opening weeks of the Institute were displayed such electrical wonders as the stroboscope, together with a lightning transformer. Finally there is a complete electric kitchen.

All of these displays open into a common auditorium, with living room and kitchen at the sides, stage at the front and lighting display at the rear. Leaving the auditorium the visitor passes through a promenade where pictures of Public Service Company properties are displayed. Before going up the stairs to the second floor sales room he passes an artistically lighted garden.

The Institute is staffed by the utility with James T. Coatsworth in charge and with Miss Evelyn Dane as home economist. It was designed by R. Irving Stiffler and W. Gordon Jamieson, Denver architects. Particular attention was paid to color harmony, especially in the kitchen which is finished blue and yellow. Elaborate control equipment for the lighting is a special feature. Comfort is assured by a modern air-conditioning installation.

The Institute was conceived by Gaylord B. Buck, general commercial manager of the utility, who is also president of the Rocky Mountain Electrical Assn.



Denver's new Electric Institute will be the focal point for cooperative industry sales programs. At the top is a view of the auditorium with the electric kitchen to the left and the model living room at the right. Not shown is the Better Light-Better Sight display. Center view is a closeup of the living room with its modern lighting. At the bottom is a view of the electric kitchen, complete in every detail, even to a modern breakfast nook

Bill Jones Speaks + + +

. . . about the Sales Managers' Big Chance

IF I were a Sales Manager in this year of October, B. C. (Before the Crash), I would do some unaccustomed thinking. I would get to bed early, pile up the pillows three feet deep, forget that this is the night for my favorite broadcast, wonder which of the neighbors' dogs was doing the yipping, cuss the weather, heave maledictions at the gnats which had filtered through the screen, relax—and spend a few hours pitying the Manager, even if he doesn't deserve it. With a concentrated effort it is not impossible to force one's self to feeling quite charitable toward even such an individual.

In the morning, of course, when the sunshine reveals the drab pigments of reality, I quite likely would experience a relapse. How could I forget the innumerable times he has turned down some of my most brilliant plans and schemes—any one of which would have saved our company from its certain trend toward senile decay?

What a mess of things he has made. For ten, fifteen, twenty years he has but drifted with the tide, smug in a business which has developed itself and has become prosperous despite its over-all dumbness; one which has first strenuously resisted and then grudgingly permitted the manufacturer to multiply its business for it.

However, let by-gones be by-gones. He would have been a good chap if he had been brought up differently—if he had paid more attention to the Sales Manager. Now he is in the dumps, perplexed, befogged and whipped. He despairs because he can't even guess what the Government is going to do next.

The Sales Manager, at least, knows the answer to that one. The Government is going to do anything and everything necessary to get votes.

In 1900 achievements of our alleged business-getting departments were measured in terms of dollar sales, which meant nothing; in 1910 we shifted to a count of ranges and other appliances, which meant less; in 1920 we began glorifying the number of new kilowatts connected, which was most useful, as it demonstrated our mental poverty; in 1930 we combined the appliance count with a guess as to its unit consumption—just as though we sought to find the answer to "How many potatoes do ten oranges and four apples make?"

TVA and kindred brain storms have painted the picture very vividly. It has awakened the people to demand a real "public" service," available to all of the public. Actually, thus far, we have thought of our activities as industrial enterprises, giving only such service as would get us by. We maintained that even reasonable demands for such could not be met because they would not be "self liquidating." If that is true, we are just out of luck. But it isn't true.

Just keep in mind the fact that from now on the public will get public service from a "public" service company which will be just what those words mean, or it will cease to be at all. Eventually we shall find the day—why not now.

It will call for not only revision but entire scrapping or archaic rate structures; it will mean hard times for a lot of us; it will mean acceptance of new and unaccustomed viewpoints, new methods of financing, new everything, and more than all it will mean building up to our claim of being a "Public Service Company"; and what is still more painful, it means that load building, for the moment, must be incidental to a broadened service.

It is trite to say that all of these things should have been done twenty yars ago. Yet, if we tackle the problem intelligently and enthusiastically, in the end we will bless TVA for having unwittingly and unintentionally performed a service to us by marking a road we have long contemplated but which we never had the courage to sincerely explore.

The nut to crack is whether we are going to go along with TVA principles a considerable distance, or are we going to sit back on our injured dignity and sulk.

And here is where the Sales Manager, Commercial Manager, New Business Manager, or whatever he may be called, may come into his own, if he can rise to the opportunity. The heads of his industry are bewildered by years of conventional training and thinking, and by shattered confidence. Never was the time so ripe to break through the aura of complacency and of inspired political confusion. Sales organizations exist because of their presumed knowledge of human nature in the mass. Psychologically they are far more likely to be adaptable to "religion" and be better equipped to meet the hypocrisy of the new situation. Unless they are hopelessly blinded by precedent and have degenerated into mere peddlers, they can, more than any other department, help the way out of traditionally fettered thinking and the morass of incendiary political propaganda. Today, at least, they will find grateful, attentive and sympathetic ears into which to pour their ideas—any ideas. But they will have to do far bigger thinking than ever before and they will have to become bigger men.

It is not likely that anyone in the industry will be in any measure blinded to the humbug of the "utopian," "humanitarian," "social justice," "human rights" buncombe of the times. One of these days—this year, next year or some other year the fakers are inevitably going to run squarely against the immutable law of diminishing return.

In case you are not on speaking terms with the engineering department, the law of diminishing return is, in effect, that twelve pretty girls are not twelve times as pretty as is one pretty girl.

BILL JONES.

Who and Why

Bill Jones is a real enough person. Though his name is a common one, so is the brand of sense that he exercises. In these columns each month, Bill Jones will speak. When he does it will be worth listening to, for he sees clearly, thinks squarely, and talks plainly about selling. You will derive wisdom and perspective, as well as the enjoyment of an occasional chuckle from his comments on men and methods in this business of ours.

Electronics Aids Horticulture

Experiments in Irradiating Plant Seeds With X-Rays Produce New Varieties and Colors, Increase Percentage of Germination and Hasten Growth. Future Possibilities Must Be Determined From Further Research.

By E. C. CAREY
Seattle, Wash.

NEW and useful electrical tool for introduction to the flower grower, the horticulturist and the hybridizer, who in the past have been able to produce new varieties of plants and flowers only through the process of cross-polenization and watchful waiting, is the X-ray. The rate of mutation of plants and insects has been increased several thousand per cent by the application of ionizing irradiation such as the X-ray, cathode ray, radium and high frequency oscillations. Laboratory experiments under very definite control conditions have produced gratifying results with X-ray irradiation of plant seed.

During the past two years experiments were conducted in the Pacific Northwest with notable achievements, particularly since the results were secured with a very limited knowledge of genetics or hybridism and without the equipment available in a modern research laboratory. The principal experiments were conducted with seed from the holly, the gladiolus and the Regale lily, all of which were subjected to treatment with a standard Westinghouse therapeutic and deep therapy X-ray equipment.

The seeds to be treated were placed in a lead container and located approximately 12 in. from the target of the X-ray. The entire amount of the seed for the experiment was placed in the container and irradiated for a definite time. The intensity, the penetration, and the time interval of irradiation were maintained constant for each experiment. Samples of the seed were removed and marked at the end of each time interval, while the seeds remaining in the container were stirred and again irradiated for the same time interval.

Three varieties of holly seed were irradiated at 70 kv. and 4 milliamperes. Eight samples of seed were removed at intervals of eight minutes. These seeds were planted out of doors June 29, 1931.

Normally a period of two years is required for the germination of seed, but within eight months after the planting, a number of these irradiated seeds had germinated and many of the plants showed signs of very vigorous and rapid growth. A few died soon after germination, or following the growth of only a few inches. The highest percentage of germination and the most rapid plant growth were from seeds irradiated from 24 to 32 min. It is interesting to note, too, that not a single untreated seed germinated during this period.

In the autumn of 1932, thirty-seven of these small trees, ranging from 2 in. to 8 in. in height, were removed from the seed-bed and transplanted. None were lost in the transfer, and within two years from the time these irradiated seeds were planted, the small trees were continuing their vigorous growth, a number having reached a height of 14 in. One year later some had attained a height of 24 in. One of these trees showed very definite trailing or horizontal characteristics. Some of the leaf-coloring and markings, rangings from deep-brown to a very light yellowish green, were unusual and distinctively different from the parent trees. They were noticeably free from disease and showed no tendency to damp off.

In the spring of 1933, some two hundred of the remaining seeds had germinated and one hundred seventy-five one to three inch trees were transplanted from the seed bed in October, 1933. Growth of from eight to twenty-four times normal resulted from the irradiations.

Regale Lily

Two sets of experiments were conducted with seeds from the Regale lily. Samples of these seeds were obtained from a grower whose stock was vitually free from variations. The first sample of seed was irradiated at 70 kv. and 4 milliamperes. The same method of irradiation and the manner of removing samples were used as with the holly. Five samples of irradiated seeds were removed and the maximum time of irradiation was 40 min. These seeds were planted in an outdoor seed-bed, and one month after planting the following observations were made:

Sample	Time of Irradiation in minutes	Percent of Germination
1	8	5
2	16	5
3	24	5
4	32	25
5	40	50
6	Control	10

The subsequent plant and bulb growth followed very closely in proportion to the percentage of germination. A large percentage of the seedling bulbs were killed, due to unexpected cold

Holly trees from seeds which were not treated show only a 2 to 3-in. growth in 24 months (left). Treated seeds produced a variety of trees ranging in height to 24 in. (right). Percentage of germination also was increased by irradiation

winter, but some five hundred survived. A number of these lilies bloomed fourteen months after the planting of the seed, and several of the blossoms were a very definite improvement in color and texture over the parent plant. The plant foliage also showed some very unusual markings and growing characteristics.

These observations, however, will have to be continued for another year to determine exactly what mutations have taken place. As noticed in connection with the holly experiment, the Regale lilies were singularly free from any disease or damping off tendencies, even though they were planted out of doors in unsterilized soil.

In the second experiment, the Regale lily seeds were treated at 70 kv. and 10 milliamperes. Not a single seed of this experiment germinated. It is impossible to determine whether this was due to the irradiation or to the character of the seed. It is to be noted, however, that a few of the control seeds did germinate.

Gladiolus

Two samples of gladiolus seed were next irradiated at two different intensities. The first sample was irradiated at 70 kv. and 10 milliamperes, while the second sample was irradiated at 100 kv. and 5 milliamperes. Samples of seed were removed at five-minute intervals; the total time of treatment for the 100 kv. experiment was 90 min.

These samples were planted in rows 4 ft. long and 8 in. apart, each row representing a carefully measured amount of seed, as well as a definite amount of irradiation. Several rows of control seed were planted adjacent to the irradiated seed, and although subjected to the same soil and other conditions, the irradiated seeds in general excelled in both germination and plant growth. In practically every row there appeared one or more plants of exceptional vigor and promise and much above the average of the adjacent plants within that row. A number of plants blossomed six months after the planting of the seeds. The bulbs of the flowering plants were unusually large, exceeding 1½ in. in diameter in many instances.

During the first season there was little noticeable difference in plant growth or percent of germination, resulting from the two treatments but the second season showed a distinct gain in the plant and bulb growth, as well as in the flowering characteristics of the bulbs treated at 100 kv. over those treated at 70 kv. There was, likewise, a very noticeable gain in plant growth, flowering characteristics and size of bulbs over the irradiated seed as compared to those from the control seed.

Many of these plants flowered during the second season, and the flowers varied from very small four-petaled flowerets to very large six-petaled blossoms. The petals varied, too, from the delicate tint and texture of the orchid to the very deep, rich tones and the stiff, quill-like petals of the zinnia. The color and color-markings were so varied that it was difficult to find ony two blossoms alike. Many new and interesting pastel shades and color combinations ap-

It is too early to say just exactly what effect the irradiation of the gladiolus had, since the seeds were secured from a number of hybrid-gladiolus, grown in the same field where no attempt was made to prevent cross-pollenization. There are, however, a number of observations which indicated some of the results of the X-ray irradiation. These are freedom from disease and damping off, increased production of corms, increased size of bulbs and plants, and an increase in the number of mutations.

Much experimental work remains to be done before it will be possible to predict accurately the results of irradiation on genetics. However, the experiments conducted to date prove conclusively that X-rayed or other forms of irradiation or combinations of different forms may produce many different varieties of plants and flowers. Until further experiments are conducted, the conclusion that must be drawn is that electronic devices producing ionization may have a wide and useful application to horticulture and perhaps to other forms of agriculture.

Gladiolus seed irradiated at 100 kv. and 5 milliamperes produced remarkable results. Some plants bloomed within six months. This picture shows one plant which flowered after 14 months. The stem produced 18 flowerets 5 in. indiameter. New and delicate color shades also were developed

PURPOSE

BECAUSE agriculture constitutes one of the largest potential fields for the development of new load for the power companies and additional business for the contractor and the manufacturer, this section on rural load-building will be a regular feature of every issue of Electrical West. It will contain information and ideas to help the rural power salesman, the contractor, the wholesaler and the manufacturer to build business. It will constitute an open forum for the discussion of rural electrification. Contributions in the form of material suitable for publication are solicited from every one interested in this important subject. The more subject matter received from the men on the firing line, the more valuable this section will be.

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• Issues Farm News Bulletin—Portland General Electric Co. has joined the growing list of utilities issuing a monthly news bulletin to farm customers on its lines. Its publication is a four-page, 6 by 9-in., two-column, illustrated paper titled "Pepco Farm News." Rural electrical applications of interest to its customers are described and in most instances data on actual local installations are included. This method of reaching farm customers with timely sales information was originated by C. J. Hurd of the Mountain States Power Co., and has been adopted by many companies in the Pacific Northwest.

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• Cooperates With Motor Dealers—In cooperation with motor dealers in its territory Portland General Electric Co. publishes a list of second hand motors available from various motor shops which it sends to farm customers who are prospects for motors. Data is gathered by its agricultural engineers. Most popular motor is a 5-hp. all-purpose unit that can be made portable.

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• Beer Cooler Applied to Milk—Adaptability of a new bottled beer cooler to the small retail dairy engaged in local milk sales opens a new avenue for rural load-building. These new cooling units, which sell for less than $150, consist of a water bath with a cooling coil in the bottom. When bottled milk is placed in the bath, it is quickly cooled to 40 deg. and maintained at this temperature until time for delivery. Quick cooling to low temperature improves the keeping quality and palatability of the milk.

In the Realm of Science + + +

[*Devoted to developments in pure science as they affect the electrical industry, and edited each month by electrical engineering department of a Western university*]

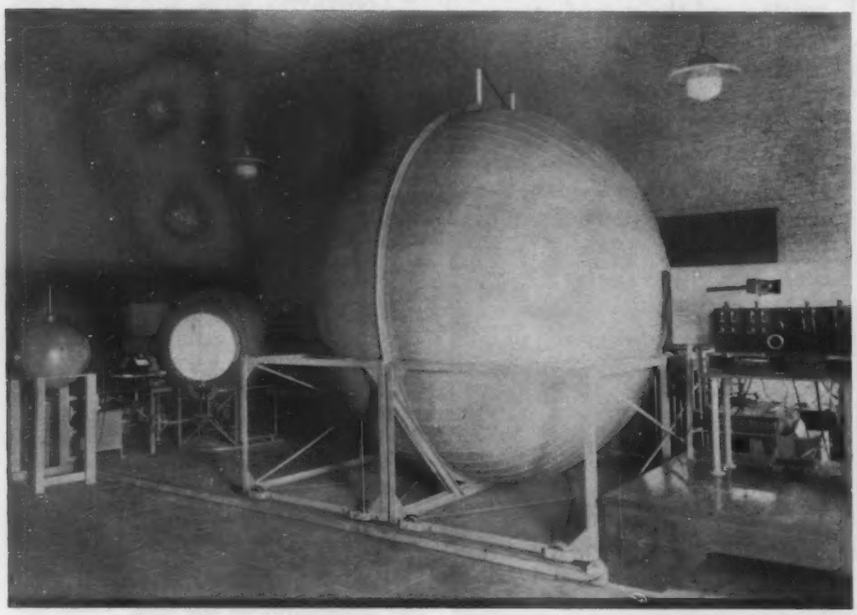
Stanford Adds Illumination Research Laboratory

By **LELAND H. BROWN**
Electrical Engineering Dept.
Stanford University

WITH probably the best equipped and most modern lighting laboratory west of the Mississippi, Stanford University now has facilities to carry on both commercial investigations and scientific research in the rapidly developing science of light application and illumination engineering. These facilities consist of a lighting demonstration laboratory and an illumination measurements laboratory.

In the former, a 36x48-ft. room with a 13-ft. ceiling, a special wiring and power supply arrangement provides complete flexibility for lighting demonstrations. Its twelve main ceiling outlets and various wall outlets are each controlled by a separate tumbler switches conveniently assembled on a switchboard. Power is supplied to the switchboard through a double-throw switch which connects the board with either the university lighting mains or to the electrical machinery laboratory where a variety of special power sources are available.

Plug and hook connectors permit ready interchange of lighting units so that practically any type or combination of types may be quickly demonstrated. Suitable metering equipment provides data on power consumption. Through the cooperation of the manufacturers, a wide variety of lighting fixtures, floodlights, street lights, and signs, as well as representative incandescent and luminescent light sources are available for demonstration and study.



Research lighting laboratory at Stanford University. At the right is the 120-in. spherical photometer, one of the largest in the world and capable of measuring illumination from complete lighting fixtures. Smaller photometers are shown on the left

The illumination measurements laboratory includes a large laboratory and lecture room, a photometric dark room, a photographic dark room, two research rooms, a shop and offices. Power supply to this building consists of 240-volt, three-phase and 120-volt, single-phase alternating current. Lighting circuits are fed separately from a 110/220-volt line. In addition, a 12½-kva. multitap auto-transformer, whose primary is controlled by a voltage regulator providing ±½-volt regulation of the supply voltage, will deliver rated current at any desired voltage in steps of 1 volt from 1 to 440 volts. Primarily this source is used as a constant voltage for lamp life tests. Direct current also is available for photometry through a small motor generator set, field control on the latter enabling the output voltage to be held within 1/10 of a volt of the desired value.

Illumination measurements equipment in this laboratory includes: a Dibdin photometer; a 24-in. spherical photometer; a 60-in. spherical photometer; a 120-in. spherical photometer; a lamp life test rack and a bar photometer.

In addition, there is a Macbeth illuminometer, a Taylor type reflectometer, several Weston illuminometers, foot-candle meters and laboratory electrical instruments. Light boxes, projection equipment and miscellaneous photographic and photometric devices complete the equipment necessary for illumination engineering investigations.

Only flash light bulbs and small lamps are tested in the 24-in. spherical photometer, measurements on which can be made only by photoelectric means. Larger lamps are tested in the 60-in. photometer, upon which measurements can be taken with a comparison lamp and either a Lummer-Brodhun cube or a flicker attachment. Visual measurements being slow, are generally used only for calibrating standard lamps or photometering colored lamps, ordinary lamps being tested by photoelectric measuring equipment to expedite and simplify routine work.

The 120-in. spherical photometer, one of the largest in the world, was designed and assembled at Stanford. It is large enough to handle complete lighting units and is used primarily to determine the efficiency of the complete fixture. The instrument is so arranged that measurements can be taken either

visually with a comparison lamp and a Lummer-Brodhun sight box or by a photoelectric cell and galvanometer. Its value can be appreciated from the fact that only two readings are necessary to determine the efficiency of a lighting fixture when a calibrated lamp is used.

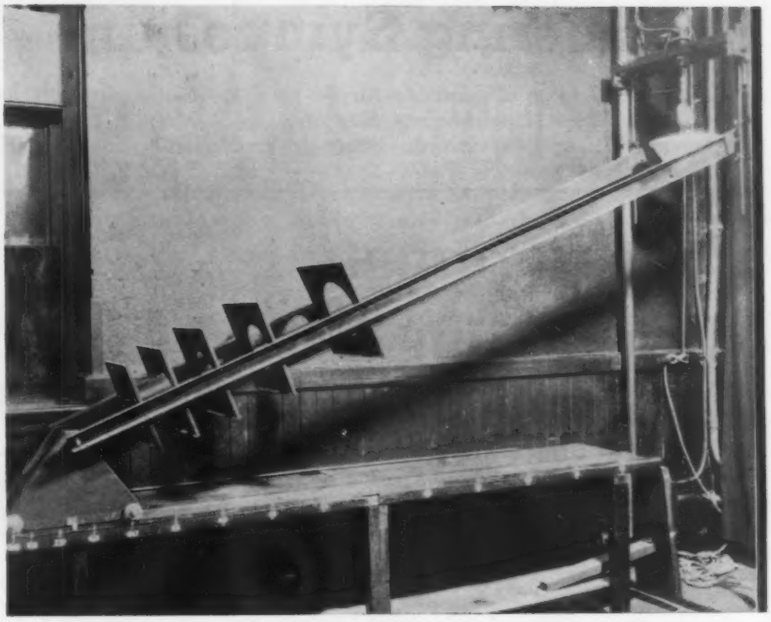
With the Dibdin photometer it is possible to obtain light distribution curves from lamps and fixtures. A rotating head supports and rotates the lamp or fixture under test so that the photometer will measure its average output in a given direction. A baffle system carrying two photoelectric cells at its far end is mounted so that it may be rotated around the lighting unit as a center through an angle of 180 deg. in the vertical plane. The photoelectric cells are maintained at a distance exactly 10 ft. from the unit and they are shielded from stray light so that the only light reaching them is that coming directly from the unit at the angle at which the baffle system is set.

Photoelectric cells used in this photometer are of the type that generate a current in proportion to the amount of light falling on them. Therefore by measuring this current with a suitably calibrated galvanometer, it is possible to determine accurately the average candlepower of the lighting unit in the direction in question.

In obtaining distribution curves of lighting units it is customary to take measurements with the distribution photometer at 10-deg. intervals through the vertical angle of 180 deg. for both the bare lamp and the combined lamp and fixture. These 36 readings then give sufficient data to plot the distribution curves of the lamp and fixture and from them, by suitable computations, it is possible to determine the efficiency of the unit.

Studies and other phases of illumination engineering, such as brightness, reflection and transmission factors, and the measurement of levels of illumination are possible with the portable equipment of the laboratory. Laboratory experiments in these subjects are possible and are being carried on with the photographic and photoelectric equipment now available.

Due to the scarcity of illumination laboratories in the West and the advantages of unbiased university laboratory investigation, there have been a considerable number of requests for the Stanford Illumination Laboratory to perform commercial testing of various kinds. In every case where it could be arranged, this testing has been done, and in the future the testing facilities at Stanford will be available to commercial organizations. By so doing the School of Engineering believes that the university will be doing a valuable educational service, and at the same time such testing will keep the faculty in constant touch with lighting practice and furnish first-hand data for class room problems. Fees for testing will be kept as low as possible and still yield a small profit which will all be used in improving the laboratory's testing facilities.



Dibdin photometer which measures from varying angles the light output of a lighting unit, revolved in the frame

Necessarily the laboratory will not do any confidential testing, the university reserving the right to publish any or all of the results of tests it makes. Anyone writing to the laboratory may secure copies of these test results upon payment of a nominal transcribing fee.

A great deal of credit for the development of these illumination engineering facilities at Stanford is due Leo G. Gianini, of the General Electric Co., who has acted in the capacity of consultant for the laboratory. The laboratory is also indebted to the many manufacturers and commercial organizations who, through donations of equipment and data, have helped make the Stanford Illumination Laboratory complete.

Lecture room of the lighting laboratory is equipped with demonstration units of all types. The switchboard at the left permits individual or group control of the units for class discussion and study

Engineering Symposium + + +

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Sludge Formation In Insulating Oils

Study of the Technique and Results of Testing Insulating Oil Under Conditions Simulating Actual Operations. Results Show Such Formations to be Materially Affected by Temperature and Various Materials Used in Electrical Equipment Construction.

By OTTO A. KNOPP
Chief of Bureau of Tests and Inspection,
Pacific Gas and Electric Company

MAINTAINING the quality of insulating oil at its highest point to insure adequate dielectric strength and efficient cooling involves continuous routine and often appreciable expense. One of the factors in the deterioration of insulating oil is the formation of sludge generally thought to be the result of oxidation of the oil in the presence of air and heat. As sludge in insulating oil tends both to lower its dielectric quality by attracting moisture and to impair its cooling ability by clogging oil ducts, its presence in appreciable quantities is guarded against carefully.

Standard insulating oil tests include check of the sludge formation in a particular oil by making tests of its oxidation under specified temperature conditions. However, it is fairly well established that sludge formation is accelerated by the presence of certain metals, notably copper which is present in transformer construction and which seems to act as a catalyst to increase the chemical action of the sludge formation.

Because only little is known about this characteristic of oil, the Bureau of Tests and Inspection of the Pacific Gas and Electric Co. was authorized to investigate such formation in insulating oil, particularly with reference to the acceleration of this phenomenon in the presence of the various materials used in transformer construction.

Preliminary steps to the investigation included a determination of the oxidation of oil with a copper catalyst present, the effect of hot oil on transformer construction materials, and the sludging of oil under conditions simulating actual operation.

In testing the oxidation of insulating oils in the presence of a copper catalyst, three brands of insulating oil were used. Three glass beakers, each containing 300 c.c. of each brand and a polished copper sheet approximately 11½ sq. in. in area were placed in an electric oven and maintained at a temperature of 120 deg. C. The test was continued for ten days and each day 10 c.c. of each brand was centrifuged to obtain the amount of sediment formed. Results of this test are shown in Table I.

It will be noted that the amount of oxide obtained by the test increased as the test progressed. The three oils all were greatly darkened in color. Dielectric strength tests made at the completion of the test in a standard test cup showed that brand A and brand B broke down at a lower voltage and brand C at a higher voltage. The values are given below each representing an average of 25 breakdowns:

	Before	After
Brand A.....	32,156 volts	25,620 volts
Brand B.....	30,200 volts	28,935 volts
Brand C.....	27,950 volts	33,564 volts

These are interesting results indicating marked physical changes in the oil which warrant further investigation. In case of the brand C oil the changes may be attributed to moisture in the original sample but not so with brand A and B samples.

Table I
Sedimentation from Exposing Hot Oil to Copper

Time Elapsed in Days	Grade A c.c.	Grade B c.c.	Grade C c.c.
1	0.050	0.030	0.050
2	0.075	0.030	0.030
4	0.100	0.075	0.100
5	0.125	0.080	0.190
6	0.200	0.120	0.175
10	0.200	0.190	0.300

Next the effect of hot oil on transformer construction materials was obtained by placing seven beakers in an electric oven at a temperature of 100 deg. C. for ten days. The contents of each beaker were as follows:

Beaker No. 1—clear oil only
Beaker No. 2—oil and plain cotton tape
Beaker No. 3—oil and varnished tape
Beaker No. 4—oil and polished copper
Beaker No. 5—oil and varnished copper
Beaker No. 6—oil and cotton with copper, both plain
Beaker No. 7—oil and cotton with copper, both varnished

The results of this test are shown in Table II. It will be observed that brand C is the most affected, brand A is the least affected by this test. It also appears apparent that the darkening, clouding, and sedimentation or sludging of the oil appear to be simultaneous effects.

Solder and laminated steel samples were also tested, but only in one brand of oil. While this was not a comparative test between oils, it is interesting to note the catalytic action of the materials. Two beakers, one containing solder and the other laminated steel, were filled with brand C oil and heated to 100 deg. C. for ten days. At the completion of the ten-day test, the oil containing the solder had darkened and become cloudy to about the same extent as an oil with polished copper; the oil with the steel had become very slightly darkened to a yellow tint but was clear with no trace of sediment or sludge.

As the foregoing test indicated that transformer materials very evidently affected sludge formation, a test was effected by simulating actual transformer conditions in the testing apparatus and recording the amount of sludge and general condition of the oils during the period of the test.

Three oils were tested simultaneously in a specially constructed apparatus (see Fig. 1) at a temperature of 100 deg. C. This apparatus consisted of a drum arrangement large enough to contain six 1,000-c.c. glass beakers. Throughout this test there were but three beakers (or three pairs of two each) used, one for each of the three oils tested. Each beaker contained a coil and 650 c.c. of the oil under test. Air was supplied through an oil bath to

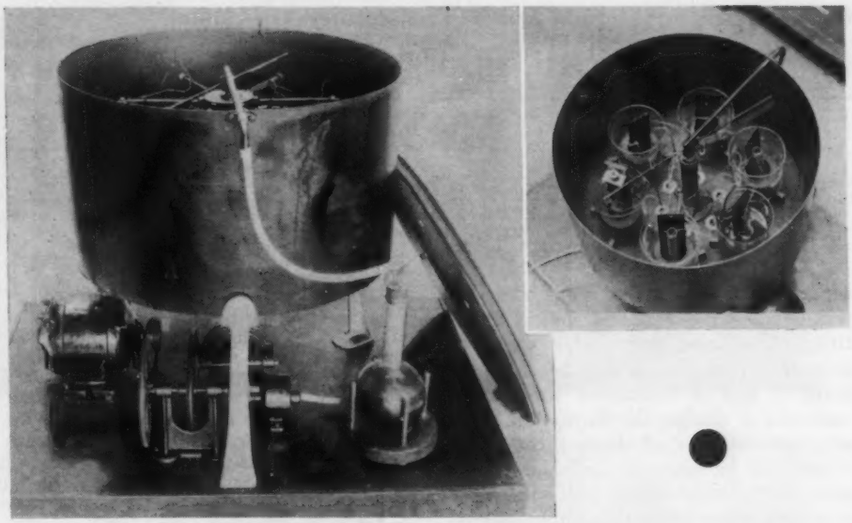

Fig. 1.—Test apparatus used in investigation of transformer oils. Six beakers shown in the upper right photograph were placed in the drum. Coils and oil to simulate operating conditions were placed in each beaker and heated by current passing through the coils. Air was admitted through the rotating nozzle to gain even distribution over each beaker, the air being washed in an oil bath before entering the chamber.

insure cleanliness to the compartment containing the coils and oil at the rate of approximately 1 cu. ft. per hour, being forced through a revolving distributing nozzle. Coils were 3⅝ in. in outside diameter, 2 in. inside diameter and 2⅝ in. high. They were wound with 840 turns of No. 20 double cotton covered copper wire impregnated with varnish and baked.

Heating was done with an alternating current, the dissipation of energy being approximately 60 watts per coil at a temperature of 100 deg. C. in the oil. The temperature was controlled by means of a thermostat switch in one beaker. Each beaker contained a thermo-couple and the oil temperature was recorded on a temperature recorder. Four separate tests were conducted, in each of which a different varnish and slightly different length of test period was used.

Results of this test are shown in Table III and it will be noted that very interesting data were obtained. By comparing the total weight of sludge obtained it will be noted that large amounts of sludge were formed when the coils were varnished. In test No. 3 the unvarnished coil had a very small amount compared with that shown in tests 1, 2 and 4, although test No. 3 ran for a much longer period. This leads to the deduction that in all transformers there is a reaction taking place while the transformer is in service that is not merely oxidation of the oil with a copper catalyst present but a reaction which includes a combination of oil, varnish or compound, air, and insulation with copper acting as a catalyst to form the so-called sludge commonly referred to in practice. The discovery that sludging is accelerated by the addition of varnish led to the investigation described hereafter.

In the first part of this test several brands of black and clear baking varnishes were selected. The investigation consisted of testing the amount of sludging of hot transformer oil with coils treated with various black baking varnishes; the sludging of hot transformer oil containing coils treated with various brands of clear baking varnishes; the effect of different transformer construction materials on the sludging of hot oil using one brand of oil and three brands of varnishes; and the effect of high potential on the sludging of hot oil containing a varnished specimen.

The apparatus used in making the varnish test was similar to that already described and shown in Fig. 1. For the investigation a number of coils were wound up, each made as nearly identical as possible. Each coil contained approximately 840 turns of No. 20 double-cotton covered, non-enameled copper wire, the resistance of each coil being made the same by varying the number of turns. This resistance was 6.60 ohms at 20 deg. C. Each coil was impregnated with a different brand of varnish and baked for 120 hours at 100 deg. C., thus exceeding the manufacturer's specification of eight to ten hours baking time.

In the first test five coils each impregnated with a different brand of black baking varnish were selected. A coil was placed in each of the six 1,000-c.c. glass beakers of the apparatus shown in Fig. 1 and the coils were connected in series. As the coils were of equal resistance and connected in series, an equal amount of heat was generated in each.

The beakers were filled with oil and outside air was supplied to the compartment containing the coils and oils at the rate of four liters per minute through the revolving distributing nozzle moving in a plane directly over the tops of

Table II—Effect of Hot Oils on Material Used in Transformer Construction

Beaker No.	Group I Oil-Brand A	Group II Oil-Brand B	Group III Oil-Brand C	Comparison of Groups
1—Clear oil only	Darkened slightly, clear, no sediment	Darkened slightly, clear, no sediment	Darkened slightly, clear, no sediment	B—darkest C—lightest
2—Oil and plain cotton tape	Darkened less than the clear, no sediment	Darkened less than the clear oil, no sediment	Slightly darker than the clear oil in beaker No. 1	C—darkest A—lightest
3—Oil and varnished tape	Darkened more than the clear oil sample in beaker No. 1, no sediment, varnish hard	Darkened more than the clear oil sample in beaker No. 1, varnish hard, no sediment	Same color as oil in beaker No. 2, varnish hard, no sediment	All very similar B—slightly darker
4—Oil and polished copper	Darkened to a tea color, varnish hard, no seriment	Darkened to a red tint, slightly cloudy with trace of sediment	Very dark red, oil cloudy and quantity of sediment	C—darkest and most sediment or sludge A—lightest
5—Oil and varnished copper	Color similar to 4, trace of sediment and slight cloud	Darkened to an orange tint with trace of sediment and cloudy	Orange color, cloudy with trace of sediment	C—darkest and cloudiest A—lightest
6—Oil and cotton with copper, both plain	Darkened to a red tint, darkest of this group, oil cloudy with sediment in bottom	Darkened to red tint, cloudy and quantity of sediment, darkest of this group	Almost black in color, quantity of sediment or sludge	C—darkest with most sludge A—lightest in color
7—Oil and cotton with copper, both varnished	Color light orange, slightly cloudy, trace of sediment	Red orange, with trace of sediment, and slightly cloudy	Darkened to red tint, cloudy with considerable sludge	C—darkest with most sludge A—lightest

Table III—Oil Sludging in Tests Simulating Actual Transformer Operation

Conditions	Test No. 1			Test No. II			Test No. III			Test No. IV		
Brand of oil	A	B	C	A	B	C	A	B	C	A		C
Kind of varnish	combination			clear baking			unvarnished			black baking		
Duration of heat	689.5 hr.			175 hr.			1404 hr.			100 hr.		
Amount of sludge in grams	9.35	19.67	18.1	29.8	32.9	26.5	0.48	0.62	0.67	22.79		21.67
General conditions of oils and coils at completion of test	Oils darkened, heavy deposit of sludge on coil and in bottom of beakers; all appear similar			Very heavy deposit of sludge on all coils. From a careful visual inspection the amounts appeared to be similar			There was less deposit and sludge on the coils than on those varnished. The grade C oil was the darkest in color			Oils very dark, the grade C slightly clearest. The coating of sludge in grade C oil appeared the thinest and of finest texture.		

the beakers at the rate of 6 r.p.m. On the opposite end of the nozzle arm an agitating vane tended to distribute the air evenly over the beakers.

Each beaker contained a thermo-couple by means of which the oil temperature was measured. Thermo-couples were so placed at approximately midway between the top and bottom of the oil that the average temperature for the beaker was determined. This average temperature was considered as the normal operating temperature.

Special tests were made to determine the relation between the average temperature of the oil between the top and bottom of a beaker and the average temperature of the windings of the copper coil. The average oil temperature was measured by taking the average of the measurement near the top and the one near the bottom of the oil, these measurements being obtained from mercury thermometers inserted in the beakers. The average coil temperature was computed from the resistance measurements of two different temperatures. Results of these tests are tabulated as follows:

Average oil temp. (°C.)	Measured oil temp. (°C.) Top	Bottom	Average coil temp. (°C.)	Temp. diff. between coil and oil (°C.)
100	107	93	129.7	29.7
90	96	84	115	25
60	63	57	72.6	12.6

In test No. 1 the coils impregnated with black varnish were maintained at 100 deg. C. for a period of 497 hours, the results of this test being shown in Table 4. Fig. 2 shows a photograph of the coils after the test run in which the comparative sludge formation with the various types of varnishes is easily discernible.

At the completion of the test the amount of sludge formed on the surface of the coils and on the inside of the beakers was carefully scraped off and measured to obtain the relative amounts of sludging caused by the various varnishes in a given oil. Any surplus oil remaining in the scraped off sludge was separated therefrom by means of a centrifuge machine and the correct quantities of oil and dry sludge were obtained. From Fig. 2 will be seen that coils 3 and 4 contained the largest amounts of sludge, the formation being so great that the oil ducts through the center and between the coil and beaker were completely obstructed and it became necessary to place a shunt around coils 3 and 4 in order to decrease the current and heating because of the tendency of the temperature to rise due to the obstructed circulation of oil. In the other specimen the ducts were obstructed only to the extent of a thin layer of surface sludge which had formed.

In these sludging tests the volume of sludge was obtained rather than the weight because the most objectional effects of sludging are caused by duct obstruction and retardation of oil circulation which in turn are volumetric characteristics. It will be also noted in specimens 5 and 6 in which the same varnish was used with two different oils that the amounts of sludge were approximately equal.

A summary of the textures and appearances of the various sludges formed from the different brands of varnish is given as follows:

Specimen No. 1, Brand A black varnish in oil C—rough layer of black sludge covering coil, of a granular texture readily scraped off. Oil duct not obstructed to any great extent. Sludge adhered tightly to sides and bottom of beaker, no odor of having been burnt.

Specimen No. 2, Brand B black varnish in oil C—rough brown layer on coil, slightly harder texture and heavier layer than on previous coil; rather hard to scrape off the beaker, no odor of having been burnt.

Specimen No. 3, Brand C black varnish in oil C—coil completely covered and oil ducts closed with black sludge of a soft spongy texture, readily removed from both coil and beaker, had distinct odor of having been burnt.

Specimen No. 4, Brand D black varnish in oil C—coil completely covered and ducts closed with black sludge, the outer surface had a skin-like texture but inside was soft and spongy, readily scraped off, no burnt odor.

Specimen No. 5, Brand E dark varnish in oil C—dull thin layer of black sludge, appears thinner than others.

Specimen No. 6, Brand E black varnish in oil A—slightly heavier deposit, otherwise very similar to previous specimen.

The next test was similar to that described above except that coils impregnated with various brands of clear baking varnishes were substituted for those impregnated with black baking varnishes. This test was conducted at a temperature of 90 deg. as a closer approximation to actual operating conditions than a temperature of 100 deg. C. used in the previous test. The results of this test and a photograph of the coils are shown in Table 5 and Fig. 3 respectively. From the measured amounts as well as the photograph it will be seen that specimen 6 gave a very small amount of sludge while specimen No. 3 gave a large amount of sludge. It was necessary to place a shunt around the latter specimen in order to prevent the temperature rise due to obstructed oil ducts.

The textures and appearances of the sludge as noted when scraping the coils are tabulated as follows:

Specimen No. 1, Brand A clear varnish in oil C—sludge on coil almost black in color, and spongy in texture, easily scraped off, very thin layer on sides of beaker but what there is, hard to scrape off.

Specimen No. 2, Brand B clear varnish in oil C—dark brown sludge of soft spongy texture on coil, coarse grained deposits on sides of beaker, and some in bottom in form of lumps.

Specimen No. 3, Brand C clear varnish in oil C—coil and sides of beaker covered with a brown colored sludge, was of soft spongy texture, readily removed by scraping, all oil ducts through center of coil and between coil and beaker completely obstructed.

Specimen No. 4, Brand D clear varnish in oil C—sludge of a light brown color, soft in texture, easily scraped off, thin layer on beaker and harder to scrape off.

Table IV—Results of Test No. 1—Black Varnish

Kind of Varnish	Temp. (°C.)	Duration (hours)	Brand	Oil Orig. c.c.	Oil Final c.c.	Sludge Amount c.c.	Sludge Weight grams	Sludge Sp. wt. g/c.c.	Oil Color
Brand A-black	100	497	C	650	380	29.5	28.8	0.980	Dark brown, clearest of blacks
Brand B-black	100	497	C	650	373	34.0	33.1	0.975	Light brown
Brand C-black	100	497	C	650	290	162.0	147.2	0.908	Black
Brand D-black	100	497	C	650	316	121.0	111.1	0.920	Black
Brand E-black	100	497	C	650	352	22.5	21.6	0.964	Black
Brand E-black	100	497	A	650	327	23.0	22.8	0.990	Black

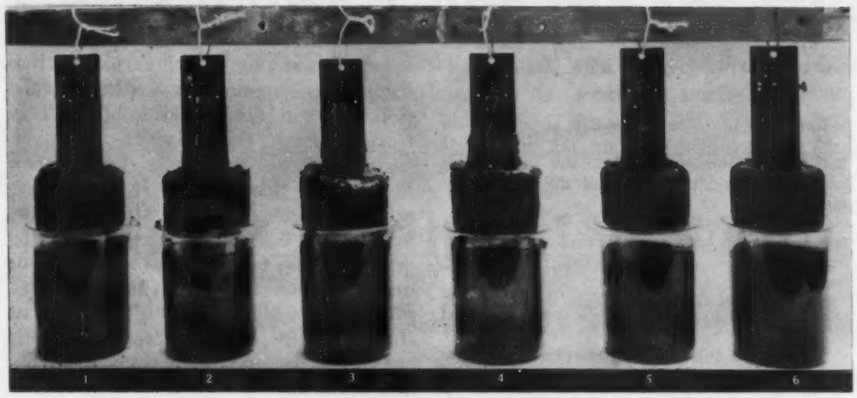

Fig. 2—Six specimens of black baking varnishes after being immersed in Brand C oil for 497 hrs. at 100 deg. C. Note the relatively large amounts of sludge formed on specimens 3 and 4. Specimens 5 and 6 are both Brand E varnish immersed in Brand C and Brand A oil respectively.

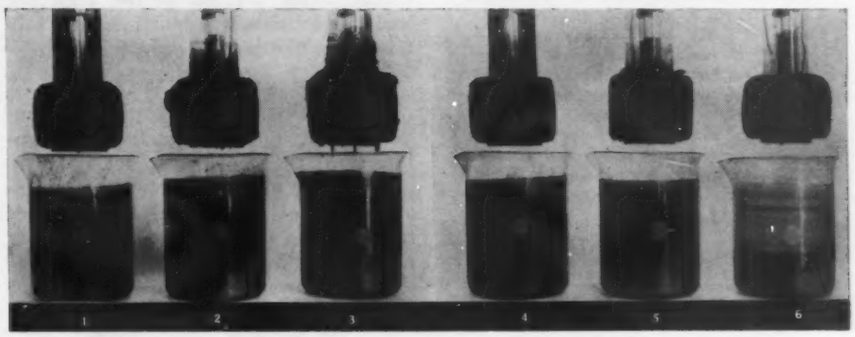

Fig. 3—Six specimens of clear baking varnishes after being immersed for 497 hrs. at 90 deg. in Brand C oil. Pronounced sludging is apparent in specimens 2 and 3.

Specimen No. 5, Brand E clear varnish in oil C—sludge almost black in color, soft texture readily removed; a thin film on sides of beaker and rather difficult to scrape off.

Specimen No. 6, Brand F clear varnish in oil C—very small amount of sludge on coil, thin deposit of loose sludge on bottom of beaker which did not adhere but could be washed around with the oil. A very thin film on sides of beaker that did not adhere tightly but could be wiped off with the fingers.

After determining the effects of various types of varnishes, it was decided to determine the effect of different transformer construction materials, including three different varnishes, on the sludging of a hot insulating oil. Oil of brand C was used in this test, which was very similar to the oven test described at the beginning of this article. Referring to Fig. 3, the upper row of beakers contain various materials as itemized in its caption varnished with brand A. The middle row contains beakers with oil and transformer materials varnished with brand E. The lower row contains beakers with oil and articles varnished with brand B. All of these specimens were heated in an electric oven for 2,880 hours at a temperature of 90 deg. C. At the conclusion of the test the oil color and amount of sludge were observed. The photograph does not show enough contrast between the various colors to make them readily apparent and therefore will be listed in the following form:

Specimens A, B and D, all of a similar deep yellow color; C and E tended to be slightly darker than the three previously mentioned. There was a slight tendency for brand A varnish to show the lightest and brand B varnish the darkest. The remaining specimens, F, G, H. I and J, were all of a very similar dark reddish brown color. The outstanding feature of the test was that all those beakers in which copper was included were much darker in color than the others, indicating the active effect of copper as a catylist in sludging transformer oil.

Because it was thought that electrical stress might influence sludging characteristics, a test was made using varnished coils similar to those used in previous sludging tests in which the apparatus would carry high electrical stress between the oil and coil. Three separate coils were used similar to those used in the sludging tests. Each coil was placed inside a copper cylinder and taped up with cotton and the assemblies placed in an oil-filled beaker, the space between the coils and the copper cylinders being approximately $\frac{3}{8}$ in. All the coils and oils were heated with an alternating current but one specimen was subjected to high potential applied between the coil and the cylinder in addition to the heating (see diagram Fig. 4). This was in an effort to more closely simulate actual transformer conditions than those obtained by heating alone. Each beaker contained 1,100 c.c. of brand C oil and was maintained at 90 deg. C. for a duration of 960 hours. The high potential applied between the one coil and the copper cylinder was 14,000 volts. In Fig. 5 specimen No. 1 consists of a coil impregnated with brand B varnish immersed in hot oil and subjected to the high potential. Specimen 2 consists of a coil impregnated with brand B varnish but in hot oil only. Specimen 3 consists of a coil impregnated with brand C in hot oil

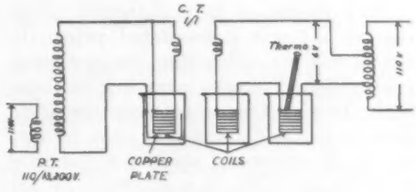

Fig. 4—Wiring diagram for test in which coils were submitted to high potential in order to create high electrical stress between the oil and coil.

Table V—Results of Test No. 2—Clear Baking Varnish

Kind of Varnish	Temp. (°C)	Duration (hours)	Oil Brand	Oil Orig. c.c.	Oil Final c.c.	Sludge Amount c.c.	Sludge Weight grams	Sludge Sp. wt. g/c.c.	Oil Color
Brand A-clear	90	3400	C	700	310	25.0	11.1	0.44	Light brown
Brand B-clear	90	3400	C	700	316	50.0	25.9	0.52	Dark brown
Brand C-clear	90	3400	C	700	351	148.0	140.7	0.95	Dark yellow, clearest
Brand D-clear	90	3400	C	700	364	18.0	14.6	0.81	Light brown
Brand E-clear	90	3400	C	700	384	30.0	28.4	0.94	Light brown
Brand F-clear	90	3400	C	700	357	5.2	4.6	0.88	Light brown

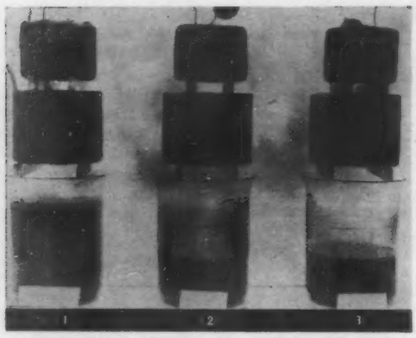

Fig. 5—Results of high potential test. Speciman 1 is Brand B varnish in Brand C oil subjected to high potential in hot oil. Speciman 2 is Brand B varnish subjected to hot oil only and Speciman 3 is Brand C varnish subjected to hot oil only. In this test the speciman subjected to high potential (approximately 30,000 volts per in.) produced almost ten times as much sludge as the two subjected to the same heat conditions but without the electrical stress.

only. Results of the test are given in the following table:

Specimen	Conditions	Varnish	Oil Remaining (c.c.)	Sludge Amt. c.c.	Sludge Wt. (gr.)
1	Hi-Pot and hot oil	Brand B	432	90	90.1
2	Hot oil only	Brand B	627	9	6.5
3	Hot oil only	Brand C	640	8.5	2.9

The following notes taken while scraping off the sludge in preparation for measuring give an idea of their textures and appearances.

Specimen 1—Heavy deposit of sludge on coil, of soft granular texture, the sludge that had formed on the bottom of the beaker was rather soft and resinous and difficult to remove.

Specimen 2—Light deposit of soft sludge on coil which was readily scraped off, thin layer on sides of cylinder and bottom of beaker.

Specimen 3—Very light film on coil, cylinder and beaker.

The high potential apparently has a very pronounced effect in the formation of sludge, in this test the amount of sludge being formed in the high potential specimen was ten times that obtained for the hot oil only.

Conclusions

The results of the foregoing tests indicate that sludge formation in insulating oil is accelerated, not only by the presence of certain construction materials, but also very much by high electric stress in the order of 30,000 volts per inch, and probably to a lesser degree by more moderate stresses. Owing to the different temperature and duration conditions of the two sludging tests between black and clear varnishes, it is impossible to establish a definite relation between the sludging characteristics of the two color classes. However, certain brands appear to be superior to others in this respect. It is therefore apparent that excessive sludging may not be so much dependent upon the quality of the oil as upon the conditions under which it is used, the same oil producing widely varying amounts of sludge under identical heat conditions but in the presence of various construction materials.

The results furthermore indicate that probably most sludge formations found a great deal in oil cooled transformers, are only to a small extent the result of oxidation of the oil. In most all cases where severe sludging is encountered, this is probably due to the creation of a compound formed between the oil and various construction materials, some of them acting as catalyst and others as constituents. The rapidity of the formation of this sludge is affected by temperature and electrical stress.

The latter effect would indicate that it is important in transformer design to avoid excessive electrical stresses in the oil circulating ducts where sludge formation is most dangerous.

Sludging Retarded By Good Design and Operation

By W. C. SMITH
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The use of oil for insulation purposes in transformer construction is now so extensive as to make it worth while to occasionally call attention to its other chief function, namely, that of cooling.

As a matter of fact, the early adoption of oil was necessitated primarily for its cooling rather than its insulating properties. Voltages were low in those early days, but sizeable capacities were soon in demand and could only be met by installing several small transformers in multiple. The introduction of oil changed the entire picture.

For proper cooling, it is necessary that the oil remain essentially free of deposits which would impair its viscosity, and would restrict the area of the cooling ducts and cover the coil surfaces with a heat insulating barrier. The problem of sludging is, therefore, an important one, both to the transformer designer and the user.

Mr. Knopp's carefully conducted tests and his conclusions therefrom, throw considerable light on this subject, and in general, agree very well with research work elsewhere. His report corroborates very definitely the position taken by the manufacturers of transformers that the liquid cooling medium used must be suited to the particular insulating materials employed.

As noted by Mr. Knopp, there is a marked difference both between various varnishes and their curing as regards the volume of sludge formed. In fact, many varnishes can be looked upon as catalysts in promoting sludge action, just as bare copper has been shown to be an active catalyst.

Under any given set of conditions, the amount of the insoluble deposits thrown down as sludge will vary the temperature. It is well known that the rate of sludging increases very markedly in the vicinity of 90 deg. C., and that the A. I. E. E. Standardization Rules set this limit for the maximum oil temperature in transformers.

As a rough and ready rule, it can be assumed that even in this limiting temperature region, the sludging rate begins to double for every 10-deg. C. increase in temperature. Particular care is needed to preclude the presence of any "hot spots" whatsoever above the Institute limit which might result in breaking down the oil.

Mr. Knopp, in his test set-up, has indicated his appreciation of another vital factor in the formation of sludge, namely, that of oxidation. Similar tests without a continual supply of air, and particularly if in closed vessels, would have shown entirely different quanitative results.

Conclusions reached in this series of tests as regards the effect of dielectric stress on sludging of the oil may, it is believed, warrant further analysis. The possible presence of corona off the edges of the copper cylinder with 30,000 volts applied may explain the marked increase in sludging. In any case, experience seems to indicate that the results were caused by some secondary effect which can be avoided by proper design.

• To Light Airways—Two lighted air lanes will be constructed between Spokane and Seattle, according to announcement by the Federal Bureau of Aeronautics. One, it is reported, will go by way of Wenatchee and the other via Ellensburg, both lanes to be a part of the northern transcontinental airway. Sites for beacons and emergency landing fields will be announced shortly.

Contractors' Code in Operation + + +

[*Practical suggestions from the code authority chairmen of the 11th and 12th Regions as to how to make code operation effective.*]

Code Coordination with Construction Industry Next

While Electrical Contractors Have Pioneered in Putting the Construction Industry Code to Work, the Time is Now Ripe for Joint Effort

THE most important code development of the past month in the two western regions, (eleven and twelve) has been the beginning of joint activity between the various chapters of the construction industry master code and the steps taken to conserve time and expense by establishing of a central bid depository for all crafts operating under that code.

While this development has just begun, and in only one locality has it really made effective headway, it is the direction in which the next steps of code operation are taking. Local associations, therefore, in all parts of the west, will do well to initiate a similar joint movement in their localities.

The construction industry code authority has provided for local code coordinating committees. To begin such groups, it may be necessary for the electrical contractor to initiate meetings of the association officers and administrative committee members of the other groups operating under this master code. Out of such meetings, a chairman is chosen and committees are set up according to instructions which are available from the code authority headquarters.

One of the first benefits which can be obtained from this work is the establishment of a central bid depository and central clerical staff to handle bids and filing procedure.

Thus, administration expense, which if carried by one group alone becomes relatively costly, can be shared so that the fees to contractors operating in such regions can be reduced. Other valuable benefits from such a set-up are: More efficient handling of details by a better qualified staff. A more impartial handling of bids by a central staff, thus removing one possible criticism of code operation. A quicker education of all groups of the construction industry in code matters, which in turn brings better cooperation with the spirit of the code and less resistence to code operation because of ignorance and the suspicion bred of ignorance.

Compliance Forms Helpful

The operation of the code is up to the contractor. None of the codes imposes any rules upon the customer—or owner—directly. Only as the contractors refuse to do business with owners on any basis that is not in conformity with their code can the owner be brought under the operating procedure of the code.

Therefore the code authority of the electrical contracting industry has issued a new form, BC-1, which is to be used in submitting all bids. It tells the owner or awarding authority that the bid is being submitted in accordance with code rules and will be void if the awarding authority does not comply with these same rules.

As a further safeguard the San Francisco Association of Electrical Contractors has adopted a procedure which other groups can use to good effect. On the submittal of a bid, the contractor brings the bid to the bid depository, has it registered, and the sealed envelope containing the bid is stamped with a rubber stamp which says in effect, "This bid has been registered with the bid depository for the ——— district, etc. By opening this bid the awarding authority agrees to comply with the provisions of the code of fair competition for the Construction Industry." This gives the awarding authority his opportunity to accept or reject the terms under which bidding procedure is conducted before he opens the bids. If he opens the bids, he is placed in the position of having accepted the terms. Plumbers, plasterers and now electrical contractors have adopted this procedure in San Francisco.

Home Rule

Contrary to all newspaper accounts and political criticism of N.R.A. the entire theory and practice of code Administration is designed to place as much responsibility as possible right in each individual locality. The code administration method is designed so that practically everything can be settled and done right in the home town, without need to wait instructions from Washington or any other center. By following the procedure set up, and by taking the load on local shoulders, practically all problems can be solved right at home. Code authority for the electrical contracting industry has requested that all queries asking for explanations, advice, or information be asked of the district and regional chairman rather than from headquarters. Full details of interpretations and methods is available from these men just as soon as it is available at headqarters, and the personal experience and knowledge of local conditions which these chairmen have is often of far more value to the solution of a problem than anything else.

This entire movement, it cannot be repeated too often, is for *self government of industry*, and is not regimentation in any sense of the word. The only real danger lies in the failure of business to assume its responsibilities under this self government plan. If N.R.A. fails, then regimentation and dictatorship are all too likely to follow.

The electrical contractor who is wise will throw his full weight against the wheel along with his fellows to make this great experiment in self government of business a success.

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• GEORGE DRAEGER, electrical contractor of San Francisco who has been very active in the membership activities of the Northern California Chapter, N. E. C. A., and is a vice-president of that organization, was made field assistant to the chairman for the 12th region, Code Authority for the electrical contracting industry. In this capacity he is devoting his entire time to this work.

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• CONTRACTORS of California, particularly electrical contractors, are preparing to present to the state legislature amendments and improvements to the California law which calls for the registration of all contractors and the withdrawal of a license for practices which are contrary to the public good.

EDITORIAL

OCTOBER, 1934

Customers' Investment

JUST who has the most at stake in the electrical business has been a moot question. Until now the audit always gave the utilities the greatest financial interest, because of the large investments made by them in generating and transmission equipment.

Unobtrusively the balance has swung away from this position. It appears now, according to figures published by the American Washing Machine Manufacturers' Association that as of Dec. 31, 1933, consumers had a greater investment in equipment to utilize electricity than the utilities did in equipment to furnish current. Utilities, the figures show, had invested $12,900,000,000. Consumers had invested $13,200,000,000 in utilization equipment. Of this, one half, or $6,750,000,000, was in household electrical equipment.

Mutuality of interest in the electrical industry between consumers and utilities has often been argued on academic grounds. Now there can be no doubt of that relation, based upon the grounds of financial investment. The problem ahead, however, continues to be that of making this relationship more conscious of its interdependence. Just now the current of public opinion is running wild on the consumers' side, blind to the inevitable consequences to utility investment and ability to serve.

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Modernizations' Opportunity

ACROSS the street the painter is busy applying a much needed new surface to a neighbor's house. Down at the corner new cement steps are being put in by another. The plumber's truck was in the block this morning with some new bathroom fittings. But not an electrician in sight, so far.

Money, the first and most easily available credit that has ever been offered the home owner on his own personal security, is being loosened from the banks and poured into the building industry. Interpretations of the kind of modernization undertaken are extremely liberal—an electric range, a water heater, connected to the mains in the house, are included. Red tape has been cut to an irreducible minimum. It is the electric industry's move. Every wide awake craft, every aggressive merchant, is already showing his customers that they can now buy and install the improvements they have long wanted, and finance the work and equipment with one of these personal loans.

One region, as described in this issue, is seeing its contractors, dealers and wholesalers join forces and its utility is assuming the heaviest advertising burden. The opportunity offered in the National Housing Act is being grasped in a manner which will insure universal success. Happily this group is applying the cooperative merchandising drive technique to the task, the method which has been so successful in appliance selling.

It is wise to modernize now.

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Lightning Studies

ENGINEERS have long contended that, except for scattered areas, lightning was not a hazard to power systems in the Pacific Coast states. Consequently investment in and provision for lightning protective equipment have not received the attention such as has been necessary in the East and Middle West. It has only been when the bolt hit home that engineering departments have recognized the hazard to service reliability.

Better knowledge of lightning storms, their frequency, the approximate period of ocurrence and the areas most affected has just been made available for the states of Washington and Oregon. In a report by William G. Morris of the Pacific Northwest Forest Experiment Station at Portland, data are compiled for those states from records which have been kept since 1925. Storm areas and frequency rates have been figured. Some data on intensity has been charted. Finally accurate maps have been made. This should help the utilities in those states materially in making provisions for lightning protection. The report shows that the hazard over a long period is a real one. It proves that such studies for other areas in the Far West would be valuable.

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Do You Read the Ads?

THERE are people who consider the advertising pages of the magazines for which they subscribe a necessary evil, but as a matter of fact they frequently bring a larger return to those who read them than do the interesting articles and admonitory paragraphs of the editorial pages. There is one dealer in the Pacific Northwest who keeps his copy of *Electrical West* always at hand. "See here," he says, finding the advertisement in the most recent issue

which pictures the article he is trying to sell and pointing it out to the customer, "this is the latest design. It is being advertised all over the country." Occasionally he displays an advertisement in his window in juxtaposition with its solid counterpart. His store has the reputation locally of keeping up to the minute and the appliance he sells, even the lesser known and untried products, have a standing which comes only to an advertised article. What do you do with your copy of *Electrical West* when you are through reading it?

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Take Them Back

SOME months ago one of *Electrical West's* readers who signed herself Ann O. Nemous wrote a letter to the editors on newspapers which aroused widespread comment and which was widely copied. As a stockholder in one of the utilities, she offered a suggestion for the protection of her investment. She has written again as follows:

> According to "what I read in the papers" municipalities are continually expanding their control over electric power distribution. Every ballot contains one or more measures which, if voted, prove destructive to the private power companies.
>
> How about the power companies going out and getting back some of that business? It's time for enterprising citizens in cities and towns where municipal plants exist, to circulate petitions and to put on the ballot measures to restore such plants to private ownership. They would have fine arguments: "Private ownership is coming back. This means more taxes in the treasury and lower taxes on property owners."
>
> This is merely an idea, but a lot of us are weary of no action—except in magazine articles.

On first consideration a lot of ideas seem farfetched. This one does not fall in such a category, particularly after a little speculation and thought.

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Enviable Denver

WESTERN cities have a right to envy Denver in the possession of its new Electric Institute. First complete permanent display of its kind in the West, the institute will serve as a focal point for industry selling and at the same time operate to build good will. Electrical men who have visited some of the elaborate institutes in the East such as those at Nela Park and other places, have wished that their community might be blessed with such a display. They had no difficulty visioning the sales possibilities, both direct and indirect. They knew that when people saw electrical appliances in natural settings, ready to use, desire to own these appliances was created. They themselves have installed lighting equipment in their own homes after such a visit. It is only reasonable for the industry to envy Denver and to congratulate the Public Service Company of Colorado for its foresight and courage in making an investment that will speed the passing on to the consumer of the conveniences and benefits that only electricity can bring to the home.

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Model Kitchens

ALMOST every department store in the country, certainly every power company, and a large number of individual dealers have installed electric kitchens in their sales rooms during the past few years. They are generally most attractive installations, embodying the latest ideas in motion study and an innumerable number of labor-saving devices and arrangements of genuine interest to the housewife. Usually they have attracted considerable attention for the first week or first month; but after that they have as a rule settled into the background.

It is a truism that we fail to notice the landscape of our own home town; so do customers and electrical sales forces tend to erect a barrier of familiarity between themselves and the model kitchens in which the little dramas of daily selling are staged. How frequently do we find this expensive weapon of trade lying idle and unused, while the battles of salesmanship are fought with less satisfactory tools around and about it. Occasionally however, we find a firm which really makes use of its equipment. This does not mean necessarily that it stages perpetual cooking schools; in fact, there is some question whether the cooking school, with its emphasis on food and recipes, is the ideal use for the electric kitchen. But it does keep the uses and convenience of electric kitchens always in the foreground.

With ensemble selling centered around the electric kitchen becoming more and more desirable, the practical sales possibilities of the model kitchen may be used to the utmost. This is being done in several localities.

There is an exclusive electric shop in southern California, for instance, which employs its own household economist and stages weekly periods of explaining and demonstrating electrical equipment and also keeps the kitchen busy through most of the rest of the week by appointment. A department store in Portland has built up an advisory department which has come to be an institution in the city, with the electrical kitchen as headquarters for information on all household subjects. It takes time and thought to remember to make use of the electric kitchen which was installed, it may be, long ago. But the effort will bring excellent returns.

Significant Trends + + +

[*Signposts which point the road to improved business or method, brief, pertinent, useful hints as to HOW someone has blazed a new trail.*]

Those Who Try — Find Business ...in Merchandising

An Editor Traveling the the Northwest Finds This True in Numerous Cases

BUSINESS is better in the Northwest. Despite two paralyzing months of strike, everyone (or practically everyone) says so, reporting twice to three times the sales of last year. And then there are the cheerful "Men at Work" signs which every few miles make highway travel difficult. The joke is an old one, but it does indicate at any rate a continuing public activity, which means payrolls and money to spend.

There is not much supporting back country to the northern California and Oregon coast. Fish, lumber, summer residents and automobile tourists offer the various excuses which account for the succession of sturdy small towns which are strung along an excellent highway. None of them are very active just now.

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• COOPERATION AT WORK — The most encouraging impression of Portland is the prevalent friendly feeling between local merchants and power companies. Here is a place where the more important electrical merchandise-load building equipment, such as ranges and water heaters, is actually being sold in department and furniture stores. There is, on the other hand, considerable feeling toward the one store in town which as a regular policy undercuts prices and offers special inducements of service. That store, in its turn, finds justification for its methods in the volume of business it has built up. There is a moral lying about here somewhere, but what it is is not entirely clear. The openly avowed (and acknowledgedly abused) policy of "The Customer Is Always Right" would wreck a smaller concern, but carried out on the grand scale, it seems to serve merely as a fertilizer in which a flourishing business grows the better. It is just one of those streams which cannot, apparently, be crossed in two jumps.

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• "HOSTESS NEWS" STOPPED — The Northwestern Electric Co. is still out of the merchandising field, but is very actively encouraging merchants. Temporarily they have given up the "Hostess News." This clever newspaper copy did not seem to bring results. The merchants felt that the brief notices of their "special offers" were of little value—and the space remaining did not give opportunity enough to build up a following for the household advice and lighting service offered by the company. It may be taken up again later in different form.

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• NEGLECTED CHANCE — In Eureka, sales of refrigerators are almost nonexistent. The climate is cold and the merchants of the community do not seem to be themselves sold on the value of electric refrigeration. There are plenty of arguments which justify the purchase of the refrigerator even in a cold climate. Hasn't the electrical industry perhaps overlooked the value of the appliance as an instrument of "cold cookery"? The simple freedom of not having to stay at home to admit the iceman is reason enough for buying an electric box.

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• WHISKERS—Marshfield has been celebrating "Paul Bunyan Day" with whiskers on all the men and all sorts of old day lumber camp atmosphere. Pioneer days of one sort or another are a feature of September in the West. They give us a chance to dress up and to play a bit with friendly neighbors. Which indicates perhaps that there is still some fundamental difference between the East Coast and the West. We hear nothing of "Knickerbocker" days in New York, with all the inhabitants dressed in knee pants or Indian blankets.

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• MORE THAN ONE LINE?—There is something of the same flavor about the old argument as to whether it is better to carry one make or several, of a given appliance. One merchant will ascribe his success principally to the fact that he sells only one brand of washing machine, or range (always, of course, the best brand)—and can, without hypocrisy, recommend his wares to the customer. Another man will tell you that the public has varying likes and that a woman sold something she does not want, will never be satisfied. He is equally convinced that his success is due to the variety of tastes which he can meet from his own stock. One plants a large acreage and the other cultivates intensively a smaller plot. Both systems seem to work; only the methods required are different.

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• MUNICIPAL MERCHANDISING—Speaking of the attitude of dealers toward public utilities, this is by no means universally good in the Northwest, any more than it is elsewhere in the United States. Some of the city-owned plants are deepest on the blacklist. One manager of a city department, whose policy is to undersell in order to build up domestic load on the lines, acknowledged frankly that he does not care whether local dealers survive or not—"That is their business." And yet it is significant that in those districts where aggressive, even so-called "unfair," merchandising by power company or municipal department has built up an electric receptivity on the part of the public, there is actually more selling of ranges and large appliances by dealers than in cities where the power company has remained scrupulously out of the game. In one small Northwestern town where a power company selling outlet has been established this year for the first time, every dealer in town is selling more electrical merchandise. One man who last year disposed of one range, this year sold eight. But he dislikes the power company intensely and wishes they would stay out and give him a chance.

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• SHOWMANSHIP—Here's another story with a moral: In one community where city cut-price competition makes life difficult for the electrical merchants, the city light department has gone out of its way to beautify its mountain plant and urban stations. It runs expeditions to the mountains open to all citizens at small cost and when it gets them there it gives them a good show of illuminated waterfalls, rock gardens and music hauntingly wafted from hidden loudspeakers. Well, one of the merchants who would be presumed to be most bitter against the wrongs done him, took the trip. And he was so affected by the beauty and sentiment of it all, that tears almost come to his eyes

as he tells about it. He has made a lot of friends for the city department which needs them politically.

• SWAPS COWS — Business practically stopped in Seattle and Portland during the strike period and it is not fair to judge the success of campaigns which extended over June and July. But apparently things have caught up the stride of returning prosperity and merchants hope to make up for lost time by fall sales. The interior region felt some slowing up, but their troubles were more those of agricultural districts the country over. The desire to buy is there, but money is scarce and down payments are difficult. One Washington dealer has solved the problem by the old fashioned Yankee method of swapping—with, of course, some cash thrown in. His principal exchange has been washing machines for cows. At one time he had some fifty cows, which he fattened up and sold for more than he paid for them. You have to be something of a farmer to make money at it, but apparently in this case all parties to the transaction are satisfied.

• MORE IDEAS—Here are some other ideas: In Tacoma the woman head of one electrical department sells sets of electrical table equipment. On the same theory that a woman prefers matching china and silverware, she believes that toaster, waffle iron and grill should be of similar design. This gives an excuse for follow up after one article has been sold. Another dealer "plants eggs" to develop refrigerator prospects. His salesmen hand the housewife an egg when the door is opened and then, while she holds it in her hand, make an appointment to explain what it is all about —in other words, to talk refrigeration.

Frigidaire dealers are utilizing the idea of giving away food with refrigerators—the food which the housewife will save by the use of electric refrigeration, thus dramatizing an argument. A campaign along these lines is on in Portland and also in Eugene.

One dealer in Seattle put out some sixty electric refrigerators in chain grocery stores in different parts of the city —and sold half of them, most of them to out of town customers new to his firm.

• AGGRESSIVE WIN SALES—It is illuminating to talk to the dealers of a small community and to hear that business has been bad for years and is fast getting no better. And then to call in at an aggressive specialty shop and to learn that a few months before they had put on a sales campaign in the same town and had sold 100 washers in 30 days, just by calling in at every house in the place.

The chief impression, after all, from any trip into the field is that, good times or bad, there is always some business to be had and that the same people seem to be consistently getting it. They admit that for the last few years it has been hard work, but they seem not to mind working. "We used to do considerable outside selling," says one merchant, "but times were bad, so we let our salesmen go." "We found that business did not come in to us any more," says his next door neighbor, "so we went out to get it." You can take your choice.

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Cookery Council Expands Activities

THE Junior Cookery Council of Los Angeles County has decided to enlarge its scope and change its name. Eighteen months of successful activity in electric range sales has given this young and aggressive organization the ambition to enlarge its scope to include the field of all major domestic electric appliances. The move was brought about by the effort now being placed on water heater sales by the Los Angeles Bureau of Power and Light with its new one-cent rate for water heating.

At a meeting last month at which 85 were present, the council voted to change its name and broaden the scope of its operations to include the promotion of ranges, refrigerators, water heaters and space heaters. Its purpose will be to unite manufacturers, distributors, dealers, salesmen, installers, material supply people and the utilities and demonstrators of electric appliances into a selling group acting on cooperative campaigns.

The publication, "The Electric Ranger," which has been issued by the Bureau of Power and Light and edited and prepared by the Dan C. Miner agency will also enlarge its scope and change its name to meet these new requirements.

New headquarters have also been obtained at 120 East Fourth St., Los Angeles, where facilities for electric cooking and demonstrating and schools will be provided.

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Plan Lighting Drive

A COOPERATIVE lighting activity to begin about Oct. 15 is being planned by the Bureau of Radio and Electrical Appliances of San Diego County in cooperation with the San Diego Consolidated Gas and Electric Co. Employee campaigns to sell lamps in past years have brought criticism from dealers who felt that while the house-to-house selling of lamps by employees doubtless filled sockets it also loaded the customers up with enough lamps to serve them the remainder of the year and materially cut down the ordinary run of lamp sales.

Handling this problem cooperatively by dealers presents a great many other very difficult problems and a special committee was appointed by the bureau to study and recommend a plan of procedure. On this committee were named Sam Hall, manager of Electric Supplies Distributing Co.; F. Munroe, General Electric Supply Corp.; H. Calloway, Thearles Music Co.; G. Dutton, of Dutton Radio Co., together with E. W. Meise, San Diego Consolidated Gas and Electric Co., president of the bureau, and J. Clark Chamberlain, manager of the bureau.

Other campaigns planned by the bureau for the fall include a radio campaign for the sale of radio receiving sets and the annual big Christmas campaign during the month of December. Refrigeration will also be featured in broadcasting conducted for the bureau under the direction of F. M. Raymond, superintendent of advertising, San Diego Consolidated Gas and Electric Co.

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Spokane Plans Told

ANNOUNCEMENT of the merchandise promotion which is to be presented and advertised by The Washington Water Power Co. for the months of September, October and November has been made by that company and to serve as a guide to the dealers in that region for tie-in merchandising plans. The program for September called for sales of Westinghouse automatic electric irons at $6.95 with $1 trade-in for old iron. Terms were $1.45 down and $1.50 per month for three months. Vacuum cleaners were also featured at $59.50, $5 down and $5 per month. Sept. 17-22 was the annual "Chronicle" cooking school.

October merchandising features a $12.50 electric air heater and a Hotpoint circulator at $7.95, both sold $1.45 down and $1.50 per month for four months. A Better Light-Better Sight campaign will also be conducted intensively during that month.

The electric washer and ironer campaign begun in October will be continued during the month of November as will the Better Light-Better Sight campaign of lighting. In these activities the entire trade will find stimulated interest on the part of the buying public and should be able to capitalize on the advertising being done by the company.

...in Engineering

One of the new sodium-vapor highway units installed on Foothill Blvd. near Monrovia, Calif. Note extension from the pole to bring the unit near the edge of the highway; also location of the small transformer on the crossarm

First Sodium Lamps Lighted By Edison Co.

In a race with the city of Pasadena for the distinction of being the first to turn on a sodium vapor lamp installation of street lighting equipment in the West, the Southern California Edison Co., Ltd., won when on Sept. 12, the first units of its experimental installation were turned on. The units were mounted on the main Foothill Blvd. highway just east of Monrovia and near Duarte, Calif.

The Edison installation is an experimental one in every sense of the word, the company financing the entire experiment to determine the effectiveness of this new method of highway illumination. The units are mounted on poles 25 ft. from the ground, and on a bracket arm extending five feet out from the poles. Spacing is about 250 to 300 ft. between units. The units themselves, illustrated here, consist of aluminum castings, out of which the lamp projects on a horizontal plane. Aluminum reflectors finished in the newly discovered process treatment, are shaped like vanes, one of them curling above the lamp, another below it, and a third cutting across the axis of the bulb and extending from it in a slight downward curve.

The installation was rushed so as to be ready and operating at the time of the California League of Municipalities convention at Pasadena, late in September. The company has not yet determined upon a rate or other operating conditions for this type of installation, hoping to derive the necessary data for computation of these factors from this trial installation, which is being closely metered and checked.

Located on a four-lane, fast-traffic highway, the effect on the traffic is also being noted. The installation extends one-half mile.

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Illumination Meter For Low Intensity Measurements

Of interest to illumination engineers, particularly those who are responsible for street lighting and other low intensity lighting installation, is a new illumination meter which will measure accurately light intensity from 0.02 to 500 foot-candles. The accurate measurement of the extremely low intensities of street lighting fulfills a long-acknowledged need of utility lighting engineers because it will enable them to present factual information to municipal organizations. Such information may assist in securing the adequate street illumination that will prevent crime and accidents and undoubtedly will tend to curb the practicing of short-sighted economy by which many towns and cities have curtailed street lighting beyond the danger point.

Manufactured by the Weston Electrical Instrument Co. and known as Model 603, the new illumination meter uses Photronic cells as light targets, two such cells being used for higher intensities and a bank of six being used at the low ranges. The latter group is permanently mounted in the cover of the meter, the complete meter assembly weighing approximately seven pounds. Readings are taken directly from a scale having three ranges of 1/2.5, 5/25, and 100/500 foot-candles, the scale reading being controlled by a small switch on the face of the instrument.

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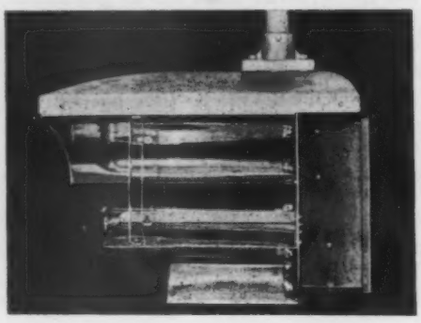
Close up of one of the sodium-vapor units. The lamp is burned on a horizontal plane, with the reflectors to direct the light placed above and below it



New Cable Acts As Fire Extinguisher

Cable failures with their attendant high temperatures are accompanied by the generation of inflammable gases produced by the disintegration of the organic insulation of the cable. On low voltage networks, many utilities make it a standard practice to burn off a fault and where this is done inflammable gases are produced in large quantities. The burning of these gases and the cable insulating materials is liable to damage ducts, manholes or nearby cables.

To overcome this condition and minimize the damage both to the cable and nearby surroundings when a fault develops in the cable network, the General Electric Co. has developed a paper-insulated cable treated with Pyranol instead of oil. While Pyranol volatilizes at arc temperatures, it is non-inflammable in both its liquid and volatile form. The gases produced by the arc being non-inflammable, they act as an effective fire extinguisher and retard the combustion of the paper insulation.

At present, this type of insulation is limited to 600 volts and is adapted to low voltage network cables only. The application of this principle to the insulation of higher-voltage cables is now under development.

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220-Kv. Cable for Paris Reported by Engineer

According to D. M. Simmons, chief consulting engineer of the General Cable Co., who recently returned from an extensive trip through Europe, a 12-mile installation of oil-filled, 220-kv. cable is being made in Paris. This is the first installation in the world of a cable at this voltage but no trouble is anticipated in its operation in spite of the extremely small clearances possible.

European engineers are devoting much thought and study to cable construction in an effort to obtain satisfactory high-voltage cables which do not employ the conventional oil-filled principle with its attendant need for large oil reservoirs in each section. One of the most interesting described by Mr. Simmons was the sealing of an oil-filled, lead-covered cable in a welded pipe into which air or nitrogen was introduced at a relatively high pressure. The pressure on the outside of the cable insures that the oil in the cable will fill every space or void which might be created by successive expanding or contracting of the cable under load changes.

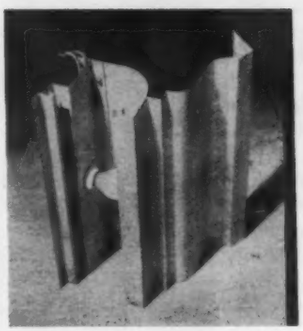
Interest in this development because of numerous possible applications here in the West will be keen.

Left: a plane of light sweeps down the face of the building to illuminate its sign and show the dairy off as a model of cleanliness. At right is shown the lighting trough installed, looking up into it from directly below. Below, in the center column is a section of the troughing, showing the lamp mounting, wiring gutter and channels for the glass

Does the Complete Mechanical Job

MOTOR shops which equip themselves, both in knowledge and machinery, to render an industrial the complete mechanical job for their plant, are shops which are looking ahead to the future. The trend is toward enlargement of abilities and services, rather than close specialization on a business which is being changed right under their very foundations by the tendency toward built-in motorization of industrial machinery.

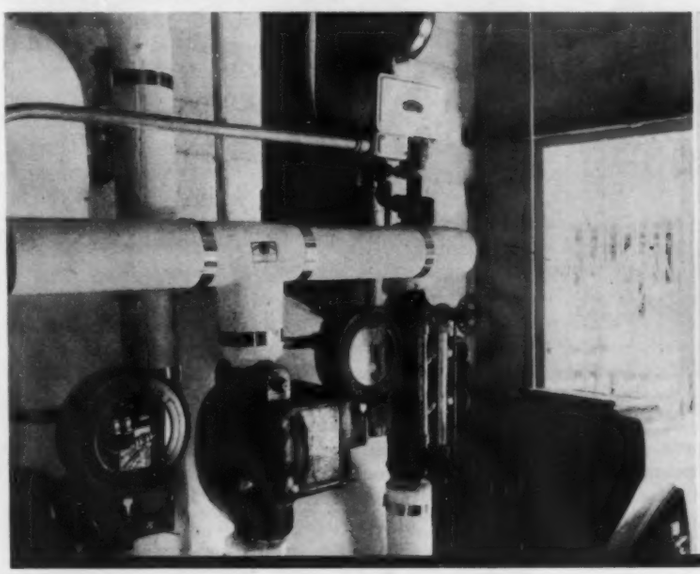
A small city shop awake to this tendency is North Bay Electric Works, of San Rafael. In a recent job for the Lucas Valley Dairy, of that city, this motor shop did every bit of mechanical work—all electrical wiring, pipe fitting, steam sterilization equipment, refrigeration, insulation of cold storage rooms. conveyors, installation of dairy machinery, lighting and heating. It built the cooling tower, installed refrigeration, and worked out interrelated control.



Below, left: Steam boiler, with automatic coal stoker, operated at predetermined pressure settings by Mercoid switches. Right: Office, with Red Seal certification, good lighting, time clock controlled, and electrical conveniences

Owned by a concern also operating an ice plant, next door, and a feed and coal yard, at the rear, the job involved piping in refrigeration from the ice plant, and providing the steam for sterlization from an automatic coal stoker equipped boiler, made to utilize waste coal dust and chips. The stoker is operated by pressure controlled mercury switches. Two switches are provided on the boiler feed water, one in case of emergency. If the second switch opens the fuel feed is automatically cut off and an alarm rung in the plant.

Air conditioning, in the form of a dehydrator, was installed in the cold storage room. The wiring was installed to the Red Seal commercial building standards of P.C.E.B. and was certified.



...in Wiring Rules

Three Theories of Code Drafting Told in Northwest Convention

THREE distinctively different theories for revising the National Electrical Code, one from the utilities, one from the Portland and one from Seattle were offered for the consideration of the Northwestern Section, International Association of Electrical Inspectors at the eighth annual convention of that organization at the Multnomah hotel in Portland, Ore., Sept. 17-19, 1934. These were discussed without formal action being taken. The several article committees offered recommendations for changes in provisions of the code and those receiving the approval of the convention will be passed on to the Electrical Committee, N.F.P.A. for consideration by that body in its code revision work this winter.

This was the first meeting of the Northwestern Section since 1932 and the sessions were presided over by A. M. McLean of the Portland inspection department, president. At the closing session, J. F. Julian, electrical inspector of Wenatchee, Wash., was elected president, the other elected officers being vice presidents, M. P. Hotelling, Seattle inspection department; E. G. S. Pryor, Underwriters Laboratories, Seattle; secretary and treasurer, F. D. Weber, Oregon Insurance Rating Bureau of Portland; members of the Executive Committee: J. L. Pegram, Washington Department of Labor and Industries, Olympia; H. L. Taylor, inspector, Vancouver, B. C.; N. L. Bost, National Electric Products Co., Seattle; R. C. Kenney, NePage McKenny & Co., Portland; G. I. Drennan, Pacific Power & Light Co., Walla Walla; Tom Widrig, inspection department, Seattle.

The utilities proposed National Electrical Code rearrangement (previously referred to) was merely presented for consideration by Victor H. Tousley, secretary of the international association. This code, which enunciates basic safety principals, segregating these from regulations for fabrication practice, was not discussed because of the fact that it has been so recently released no one had had an opportunity to examine it.

The method by which Portland seeks to make the code more suitable for local use by additions to and subtractions from it was presented by L. W. Going, chief electrical inspector of that city. This plan is embodied in an ordinance which is to be proposed before the city council and is made effective by adopting the N.E.C., as amended by a supplement containing the additions and subtractions.

A totally different idea being developed in Seattle was offered for consideration by H. A. Patton, Washington Surveying and Rating Bureau of that city, and M. P. Hotelling, electrical inspector. This plan contemplates an editing of the code in which the language of the code will be made more definite in an attempt to make its provisions unquestionably enforceable before a court of law. The merits and demerits, facts and fallacies, possibilities and impossibilities of the Portland and Seattle methods of code revision were broadly discussed without any crystallization of opinion developing.

Touching on various phases of the activities of the international Association, W. J. Mahan, New Haven, Conn., its president, pointed out the unselfish character of the position of the inspector in the industry, stating that the performance of the inspectors' duties of seeing that electrical wiring is safely installed and that safe materials are used constitutes a real service to the public at large and to every branch of the electrical industry; this is almost an echo of the note sounded by Franklin T. Griffith, president, Portland General Electric Co., previously in his address of welcome. Mr. Griffith pointed out that capacity was greater and load less now than it was in 1929 and entered the plea that without sacrificing safety and adequacy, inspection departments look with favor on any means of lowering the cost of utilizing electric service to the public through lowering the price of wiring and appliances.

Charging the electrical industry with having failed to sell the public adequate wiring to take care of fast increasing load, A. Penn Denton, consulting engineer, Rigid Steel Conduit Assn., urged the classification of wiring standards according to building construction and occupancy requirements. James Smith, director, Electrical Cord Manufacturers, N.E.M.A., told of a movement commenced by his organization to place material in the hands of inspectors making it easier for these inspectors to secure proper local publicity on their work and the purposes of their department. S. G. Helper, electrical contractor of Seattle and Northwest Regional chairman, code authority for the electrical contractors' N.R.A. code, explained the machinery for administering the code authority in his district and bespoke the cooperation of electrical inspection departments with local code authorities.

In the reports of the article committees and the code clearing house committee most discussion was invoked by the changes recommended in Articles IV, V, and VIII. Failure of ready agreement as to the advisability of using bare neutral in services and various provisions for grounding, led to a decision to refer these questions to a special committee for report at next year's convention. A recommended change in the method of arriving at the minimum rating of a fuse for the feeder supplying a group of motors under Article VIII was passed over without definite recommendations. The algebraic method proposed was not deemed practical by most of those present.

An innovation in the conventions of the Northwestern Section was a "code breakfast" which was given over to an explanation of a display of inverted sequence metering, using service entrance cable, by S. B. Clark, Northwestern Electric Co. Several combinations of services for lights, range and water heating with and without time control were displayed by Mr. Clark to illustrate how the adequate wiring for such services could be simplified and made theft proof. Discussion centered around the type of cable that might be used in such installations and details of construction.

Editors Note—Report of the South-Western Section I.A.E.I. Convention at Sacramento, Sept. 24-26, could not be prepared in time for this issue. It will appear next month.

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• FIRE—"The fire was caused by the electric wiring which was installed a number of years ago, and was, consequently, inadequate for the load imposed upon it by modern service demands." This newspaper description was pointed out by V. W. Hartley, managing director, Pacific Coast Electrical Bureau, to be probably the most intelligent, constructive account of a so-called electrical fire which he had ever found in newspaper reports. He makes the suggestion that inspectors and contractors try to bring to the newspapers of their community the reasons for reporting fires from so-called electrical causes in just such a fashion. Such reporting will be the truth and at the same time will point out the necessity for bringing wiring capacities up to date.

•

• AN ORDINANCE, which would place all electrical work done by the City of San Francisco under the same provisions as govern P.W.A contracts, namely that the provisions of N.R.A. codes shall govern bid procedure, is being presented to the supervisors of that city.

Built Into the Room

Illustrative of the Trend in Built-in Illumination are the Examples on this Page, With Diagrams Explaining Method of Design

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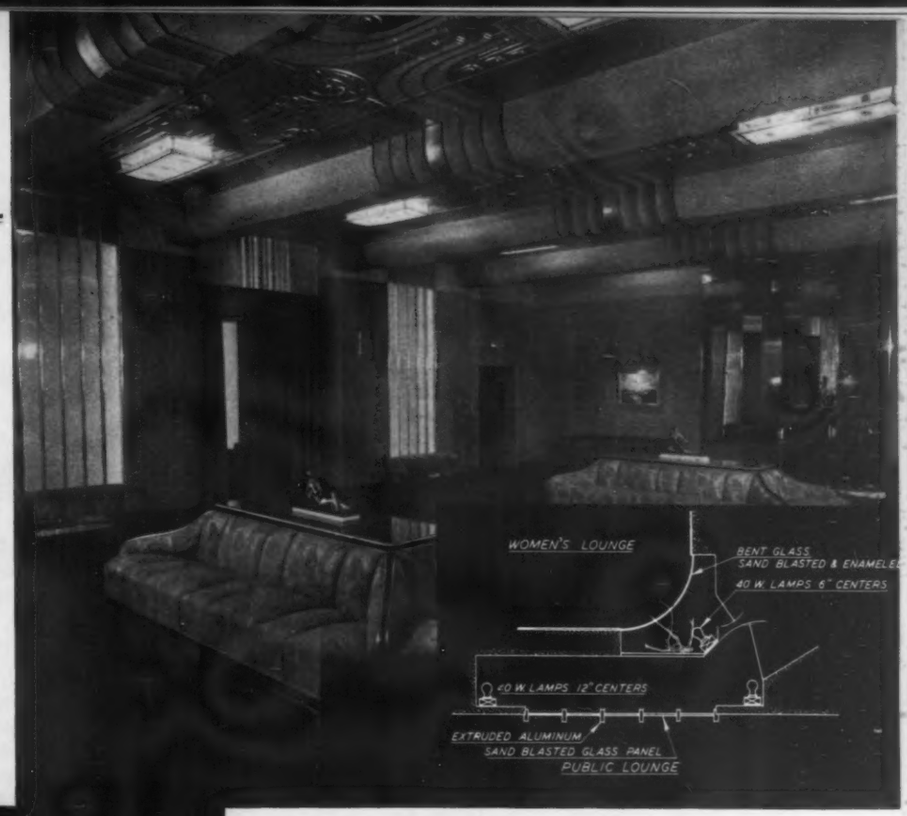
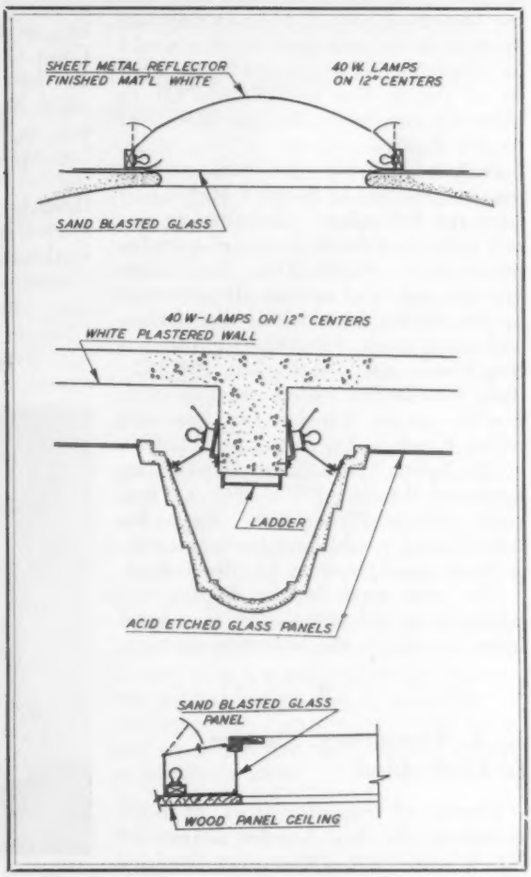


Theater lounge in which panels from ceiling to floor in one room are backed up in a smaller adjacent room by rounded corner panels, both accessible for lamping from a third room—as illustrated in the drawing

G. M. Simonson, consulting electrical engineer, fitted the equipment into the decorative scheme of the Oakland Paramount Theatre with a view to maintenance and effectiveness of the lighting for decorative purposes. Above is a ceiling cove design which enhances the decorative effect. In a room of this kind atmosphere is more important than ability to see. That effect is achieved by the arrangement illustrated in the drawing



Three diagrams above show the means used in lighting built-in panels. At the top is a drawing showing the method used to diffuse light above a sand-blasted glass ceiling panel in order to remove filament bright spots. Center shows how troughs were mounted on a column accessible from behind a false column face, to illuminate panels on each side of the column. Below is a simple arrangement for diffusing light above a panel in the ceiling

News of Note + + +

Costs Submitted For Sacramento System

Costs of various types of electrical systems to serve the Sacramento Municipal Utility District have been submitted to the district board of directors by the engineering firm of Burns & McDonnell. Included in the report were figures covering systems ranging from distribution facilities only up to a complete distribution, transmission and generating system.

The firm of Ford, Bacon & Davis, employed by the district to check the figures submitted by Burns & McDonnell, in a supplementary report charged that the estimates of the latter firm were "too optimistic". Population growth figures, rate of business increase and estimated bond interest were among the items on which the engineering firms failed to agree. Ford, Bacon & Davis held that the estimated rate of business increase as well as the estimated surplus would be affected in all likelihood by the ability of Pacific Gas and Electric Co. to meet any rate reduction put into effect by the district.

Included among the various proposals submitted by Burns & McDonnell were the following: Distribution system only capable of serving district for three years, $6,624,500; distribution system capable of serving all customers in the district, $8,136,000; distribution and steam plant, $10,390,000; distribution system and diesel plant, $10,151,000; distribution system together with double circuit transmission line and Silver Creek hydro plant, $13,237,000.

The Silver Creek figure is based on financing through PWA with an outright grant of 25 per cent. The hydro development would later be tied in with a water supply system for the district.

The next move by the district will probably be the submission of a bond issue to voters in the November election.

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L. A. Frequency Change Is Undecided

Change of frequency from 50 to 60 cycles by the Los Angeles Bureau of Power and Light system when Boulder Dam power is ready for delivery, which has been under consideration and discussion for some time, is as yet officially undecided, according to a statement from the Bureau of Power and Light. The cities of Pasadena, Glendale and Burbank, likewise considering the change-over, as they will receive Boulder Dam energy generated by the Bureau of Power and Light, also have not announced a decision.

Pasadena is reported to be withholding any action until Glendale and Burbank reach an agreement with the city of Los Angeles as to frequency. The Metropolitan Water District of Southern California has postponed decision as to which frequency it will use, having announced that either 50 or 60 cycle would be satisfactory. The Southern California Edison Company Ltd., has announced definitely that it will not change it frequency, which is 50 cycles.

•

• Power District Defeated—A proposal for the formation of a municipal utility district for the distribution of electric power in San Benito County, Calif., was defeated in the primaries by a vote of almost three to one. Principal city in the area, which is served by Coast Counties Gas and Electric Co., is Hollister. One of the instruments applied by Coast Counties Gas and Electric in its campaign against the measure was a letter to stockholders explaining the effect of a loss of territory upon their investment in the company. Included with the letter was a complete explanation and discussion of utility district agitation.

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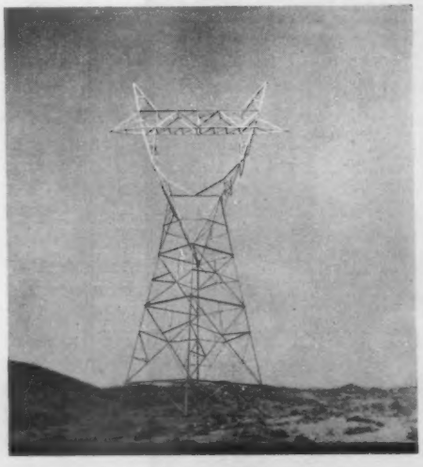
Boulder Line Tower



Work on the erection of towers for the Boulder Dam line of the Los Angeles Bureau of Power & Light is 79 per cent completed. Here is one of the single circuit towers, of which there will be 2,429. Horizontal configuration is employed. The "ears" on the top of the tower at each side are for ground wires

Wholesalers to Hear Code Report at Del Monte

Full report on the administration and interpretion of the electrical wholesaling code will be made at a meeting of the Pacific Division of the National Electrical Wholesalers Association to be held at Del Monte, Calif., October 25, 26, 27, 1934.

A. H. Nicoll, San Francisco manager of Graybar Electric Co., Inc., and past chairman of the Pacific Division, has gone to Detroit where he will attend the meeting of the executive committee of the national association on Oct. 14 and the convention of the organization on the following three days. He will bring back to the Del Monte meeting a complete report on the code and the proposed method of operating under it.

•

Bonneville Turbine Bids Rejected

Bids for two 60,000 hp. Kaplan-type turbines, together with governing equipment for the Bonneville plant on the Columbia River, have been rejected by the U. S. Army engineers. The reason announced was that the prices bid involved too great an expense.

New specifications involving changes in certain particulars are being prepared and bids will be readvertised shortly. Specifications for the generators have not yet been completed.

Initial bidders on the turbines included S. Morgan Smith Co., Pelton Water Wheel Co. and Allis Chalmers Manufacturing Co.

•

Seattle to Purchase Diablo Equipment

Bids on approximately $200,000 of electrical equipment will be taken by the Seattle Board of Public Works on Oct. 11 for the Diablo power house on the Skagit River project. This equipment is in addition to that purchased several years ago.

Major items of apparatus include 196/230 kv. oil circuit breakers, 196-kv. disconnecting switches, auxiliary metal-clad switchgear, wall bushings, station power switchboard, distribution panels and cabinets, neutral circuit breakers, rectifier equipment for switch operation, storage battery and charging equipment, oil purifying and testing apparatus, inverter, hydraulic metering equipment, telephone equipment and main unit instrument transformers.

P.C.E.A. Establishes Prize Awards; Also Sets Dates For Fall Conclaves

With the establishment of a series of prize awards for papers offering solutions to some of the pressing problems confronting the industry and with the establishment of dates for the Fall conclaves of the Business Development and Operating Economic Sections, the Pacific Coast Electrical Association has completed plans for functioning during the year 1934-35.

The entire program is in line with the desire of President Arthur H. Markwart to have the association undertake a limited number of projects which may be carried through to a logical and successful conclusion during the year.

Plans for the prize awards have been worked out to encourage the interest and participation of every member of the association regardless of the nature of their work in the industry and the geographical location of their employment. Each section has selected four important problems which will be submitted to the membership for suggested solution. Prize awards of $50, $25, and $10 will be made for the three best solutions to each of the eight problems.

Joint conclaves of both sections will be held in San Francisco and Los Angeles. The Los Angeles conclave has been set for Nov. 8 and 9 and the San Francisco conclave for Nov. 15 and 16. On the first day of these conclaves the meeting will be presided over by the Operating Economics Section and on the second day the Business Development Section will have charge.

Programs for both the conclaves will be identical, except for the discussion of the various problem papers presented. This plan of procedure has been adopted so as to limit travel to a minimum. Members of the association in that territory south of a line drawn east and west through Bakersfield, are to attend the Los Angeles conclave. Those north of this line will attend the conclave in San Francisco. Thus the southern California conclave will take in the territory served by the Southern California Edison Co. The Southern Sierras Power Co., the Los Angeles Gas and Electric Corp. and the San Diego Consolidated Gas & Electric Co. The northern conclave will take in the territory of the Midland Counties Public Service Corp., San Joaquin Light & Power Corp., Pacific Gas and Electric Co. and Coast Counties Gas & Electric Co.

Programs at the conclaves will consist primarily of the presentation of problem papers prepared by individuals in the industry best qualified to discuss the subjects selected. These will be followed by discussion from the floor.

In the case of the Business Development Section, the four problems selected for study and for prize awards are as follows:

(1) What are the most effective methods of increasing the domestic use of electricity?

(2) What are the most effective methods of increasing commercial, industrial and agricultural uses of electricity?

(3) What are the most effective methods of improving cooperation within the industry?

(4) What are the most effective methods of improving customer goodwill?

In case of the Operating Economics Section, the problems selected for presentation and prize awards are:

(1) From an operating standpoint, what type and how much load can be added to existing electrical facilities?

(2) How can the cost of electric distribution be lowered?

(3) How much free repair or maintenance service can and should a power company give its consumers?

(4) How important is voltage regulation and what are the most practical and economical methods of accomplishing it?

The problem papers will present clearly and concisely every possible factor which enters into the problem and which has a bearing on its solution. They will not in any way offer the writer's thoughts as to the probable solution. Additional angles by which the problem may be approached and possible solutions will be forthcoming in the discussions at the conclave.

The eight problem papers, together with pertinent discussion, will be published in the December issue of Electrical West. Participation in the contest for which prize awards will be made is open to every member of the association except company executives, department heads, district and division managers. All entries must reach the association office not later than March 1, 1935, and no entry shall exceed 2,500 words in length. Judging will be done by the guidance committee of each of the sections or by a special committee of judges selected by the guidance committee.

Final details of the programs for the conclave will appear in the November issue of Electrical West.

●

• FLATHEAD LICENSE DEFAULTED—License of the Rocky Mountain Co. (subsidiary of Montana Power Co.) for the construction of the Flathead power project in Montana has been put in default by the Federal Power Commission. An original license was issued in May, 1930, and subsequently the company began construction work on an 80,000-hp. hydro plant on the Flathead River near Polson. Work was later abandoned and in May, 1933, the company applied for an indefinite extension of its license. This now has been denied.

●

$15,000,000 For Bridge Rail Electrification

Approximately $8,500,000 of the $15,000,000 available will be spent for a high-speed electrified transportation system across the San Francisco-Oakland Bay Bridge, according to an announcement made by C. H. Purcell, chief engineer. The remaining $6,500,000 will be expended for viaducts, station buildings and property in San Francisco.

A considerable portion of the money will be expended for trolley wire fittings, conductor insulators, new cars and the modernization of some of the equipment now in use on the East Bay electrified interurban systems.

●

Fresno Valuation Hearings Begin

Valuation of the Fresno distribution facilities of the San Joaquin Light & Power Corp. was reported as varying from $1,735,863 to $1,884,702, depending upon the method of calculation, by engineers of the California State Railroad Commission at the opening of hearings on the application of the city to acquire the private utility's property. Physical severance damages were fixed by the engineers at an additional figure of $64,640.

Figures covering the company's valuation of its properties will be submitted later in the hearing. After the taking of testimony which will likely continue over several weeks, the final value of the property will be set by the commission members.

Because it may have some bearing upon the severance damages set, the Fresno City Council has passed a resolution to the effect that if and when it purchases the distribution system from San Joaquin it will also purchase power at wholesale rates.

●

• RURAL POWER SURVEY PROPOSED—Application for a PWA grant of $13,875 for a two-year farm electricity survey for the State of Washington has been made by Dean Edward C. Johnson, director of the College of Agriculture at Washington State College. The purpose of the survey is to assist in the compilation of market data for Grand Coulee power.

Rocky Mountain Assn. Holds Industry Clinic

Electrical interests of Colorado, Wyoming and New Mexico held a clinic in place of a convention at the annual meeting sponsored by the Rocky Mountain Electrical Association at Estes Park, Colo., Sept. 10-12. All speeches were replaced by informal discussions under the direction of previously appointed leaders.

Impetus to the Better Light-Better Sight movement was provided by two innovations. Every guestroom in the hotel was lighted by one of the new study and reading lamps. In addition, registration desk and the convention

G. B. BUCK

meeting rooms were similarly illuminated. The second feature was a spectacular garden-lighting scheme involving hundreds of acres of pines and other mountain foliage with a background of a glacier and a 13,500-ft. mountain peak.

The principal item of discussion was the Sales Rally which is a cooperative business-building drive initiated a year ago. Tentative plans were drawn for extending this activity through 1935. Final plans were drawn for a Better Light-Better Sight campaign to extend through October in which more than 1,000 employees of member companies will supplement radio, newspaper, direct mail, billboards and other forms of advertising in advancing the science of seeing.

An interesting outcome of one of the informal discussions on the subject "Are Company-Paid Magazine Subscriptions for Employees Worth While?" was that worth-while electrical trade journals perform an important function in keeping employees abreast of electrical development.

Inaugurated was an annual award of "merit for outstanding service to the electrical industry in the Rocky Mountain region" which went to E. E. Brazier, Denver manager of the General Electric Supply Corp., who has served as chairman of the appliance division of the Sales Rally during the past year.

Precedent was broken when G. B. Buck, general commercial manager of the Public Service Company of Colorado, who instigated both the Sales Rally and the new Electrical Institute, was re-elected president. Other officers include: T. C. Brown, Socorro, N. M.; K. W. Kissick, Trinidad, Colo.; and J. H. Jacobucci, Green River, Wyo., vice-president; A. C. Cornell, Denver, treasurer; and George E. Lewis, Denver, secretary and managing director.

●

Another Water-Power Act in California

Water rights and water power development will come before the voters of California in the November election in the form of constitutional amendment No. 18, another so-called "Water and Power Act". This amendment was passed by the legislature prior to adoption by popular vote of the Central Valley Water Project Act and it has been argued that it is not necessary in view of voter approval of the Central Valley plan.

The amendment grants the state and various subdivisions general authority to develop water and power without authorizing any specific project and provides for the advancement of state credit to governmental units for water and power development and sale. Indebtedness is limited to 70 years.

Of equal importance, the power of eminent domain is enlarged to permit the taking of immediate possession of property required for water and power development. Provision is made for offsetting damage to property owners by compensation in money and by water and other benefits.

●

• MORE BOULDER BIDS ASKED—U. S. Reclamation Bureau has called for bids on Oct. 15, at Denver for a miscellaneous assortment of station power transformers including three 1,000 kva., 60-cycle, single-phase, oil insulated, self-cooled transformers. In addition 48 more transformers ranging in size from 5 to 200 kva. will be purchased.

●

• UTILITY DISTRICT FORMED—Formation of the Bidwell Municipal Utility District comprising the northern half of Butte County in California, was voted by a narrow margin in the primaries. The principal city in the district is Chico. The next move, according to proponents of the district will be the organization of the newly elected directorate and the arrangement for the valuation of the property of the Pacific Gas and Electric Co. which now serves the area.

No Bidders For Los Angeles Bonds

Los Angeles City Council received no offers to purchase when it called for bids on Sept. 18 on $2,000,000 of the 1930 issue of $38,800,000 water bonds. This was the first time since the inception of the municipal Department of Water and Power that no bids were offered on its bonds. The last time the council sold water bonds, in the amount of $5,000,000 they were eagerly sought and the purchaser paid a premium of $17,000.

Officials of the Department of Water and Power declined to express publicly a reason for the change of conditions. It was regarded, however, that unsettled political conditions in the state were responsible. H. A. Van Norman, chief engineer of the Bureau of Water Works and Supply, said failure to sell the bonds will not seriously affect the bureau's program of work and extension.

●

Mexican Tariff Stops U. S. Power Sale

A prohibitive tariff of 5 centavos per kw.-hr., to go into effect Jan. 1, 1935, on all electric energy imported into Mexico, will cause the loss to American utilities which have sold power in Mexico of practically all of their load across the border. Designed to force the generation of power used in Mexico by Mexican plants, the new tariff will do just that, preliminary indications show.

A new diesel-engined power plant to serve Tijuana and Ensenada, Baja California, containing four 350 kva. generators, will mean the loss to the San Diego Consolidated Gas & Electric Co., which has always sold power to the Mexican company serving these towns, of 6.5 million kilowatt-hours per year. This new plant, now under construction, is to utilize two diesel engines and generating sets originally purchased to supply power for the construction of the Rodriguez Dam about 7 miles up the Tijuana River from Tijuana. Two new German machines have been purchased to add to the original two, and a power line is to be run up to the dam to supply construction power.

Another California company which will lose will be the Southern Sierras Power Co. which supplies Mexicali and the lower Imperial Valley delta region from its California lines at present.

●

• SPELLMAN ELECTRIC CO., specializing in industrial installations, motor maintainance and rewinding, has moved from its old location at 708-11 Mateo St., Los Angeles, to new quarters at 1928 East 7th St.

Representing three separate branches of contracting were Ed Dowd, chairman of the picnic committee, left, a contractor-dealer, and Lew Douat, of Buzzell Electric Co., a motor specialist, center, and Ed Brumfield, of Brumfield Electric Sign Co. at the right

Contractors Hold Successful Picnic

In true Eastern fashion a thunderstorm threatened to dampen the success of a picnic of the San Francisco Electrical Contractors Assn., Inc., held at Kendall-Dell picnic grounds late in August. However, a large crowd turned out and the weather proved all that could be desired. Charles Langlais, president of the association, acted as master of ceremonies and the large committee headed by Ed Dowd, Dowd-Seid Electric Co., handled the multitude of details in connection with the affair. Jim Landini was chairman of the music and dance committee, George Brouillet of the races and games, Ralph Wiley, chief of the Department of Electricity, was judge for all the contests, Vic Lemoge was prize committee chairman, Pete Decker, chairman of the horseshoe pitching contest, Dick Flatland of the baseball game between the wholesalers and contractors in which by a stacked deck the contractors won. George Smith had charge of the gate and parking.

A feature of the picnic was the provision of a public address system by Messrs. Mann and Williams, of the Eureka Electric & Radio Co. The system was portable and was used throughout the grounds to announce events and to provide music during the luncheon.

The sound truck of Eureka Electric was everywhere to broadcast sports events and music for the entertainment of the crowd

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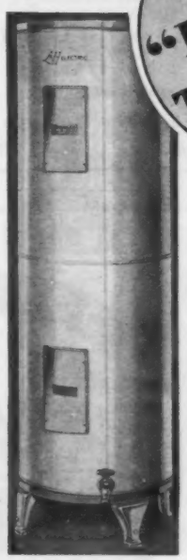

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Broad Program Features A.I.E.E. Conclave

Subjects ranging in scope from advances in television to the behavior of Lichtenberg figures were discussed by over 200 delegates who assembled at Salt Lake City Sept. 3-7 for the twenty-second annual Pacific Coast convention of the American Institute of Electrical Engineers. Aside from the representative attendance from Western districts, a number of members from the East were present, many of whom presented papers and contributed to the excellent discussions which characterized the various technical sessions.

Under the capable direction of B. C. J. Wheatlake, general convention chairman, and his committee, the five-day meeting of the institute proved of immense practical value as well as being thoroughly enjoyable. Salt Lake City hospitality and facilities for entertainment were particularly praised by the visitors who danced, swam, golfed and toured the scenic beauties of northern Utah between sessions.

Convention procedure was changed from the usual method of presenting papers. All of the papers comprising the program had been previously published in recent issues of *Electrical Engineering*. Papers were not presented in full at the convention sessions, instead their contents were abstracted and the time thus saved devoted to discussion. This procedure not only permitted a more thorough discussion on the convention floor but also enabled a presentation of more subjects and permitted a more comprehensive coverage of the rapidly expanding science of electrical engineering.

Winner's foursome — From left to right — M. M. Kenneally, of the Ohio Brass Co.; S. L. Case and A. W. Copley of Westinghouse and Howard Flye, San Francisco, manager of the Aluminum Co. of America and winner of the Fisken Cup.

Because a detailed report of the various papers and subjects presented is not practical and because the papers are already available in printed form, ELECTRICAL WEST has tabulated those of most general interest below, giving the page and issue of *Electrical Engineering* where the complete article may be found.

For the operating engineer the following papers contain valuable information on system performance and operating practice:

"The Theory of Incremental Rates and Their Practical Application to Load Divisions, Parts I and II," by M. J. Steinberg and T. H. Smith. Pages 432-45 of the March issue and pages 571-84 of the April issue.

"Joint Use of Poles With 6,900-Volt Lines," by W. R. Bullard and D. H. Keyes. Pages 890-8 of the December issue.

"Some Recent Relay Developments," by Lloyd F. Hunt and A. A. Kroneberg. Pages 530-5 of the April issue.

"Distance Relay Action During Oscillations," by E. H. Bancker and E. M. Hunter. Pages 1,073-80 of the July issue.

Lighting investigations carried on in the past year resulted in some excellent papers for the transmission engineer. Included in these were both the investigation of the characteristics of lighting discharges on high-voltage lines and the results of field tests on lines which have been equipped with counterpoises. Papers covering these investigations are as follows:

"Lightning Investigation on Transmission Lines, Part IV," by W. W. Lewis and C. M. Foust. Pages 1,180-6 of the August issue.

"Lightning Investigation on 220-Kv. Pennsylvania Power and Light Company System 1931-

WHERE TO BUY . . . IN THE WEST

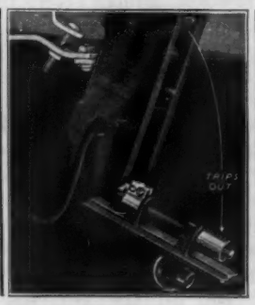
LAPP
Line Post
Insulators

Lapp Line Post Insulators eliminate radio interference due to both dirt and electro-static conditions.

Write for Bulletin No. 112 describing and cataloguing these insulators.

LAPP INSULATOR CO., INC.
Le Roy, N. Y.

KEARNEY
TRIPOMATIC
PORCELAIN HOUSED CUTOUT



Outage indicating — air gap separation of contacts—cartridge and door are a single unit—swivel hanger —point pressure contacts.

Further Information Gladly Furnished

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for
- *Safety*
- *Strength*
- *Economy*

Assured Quality
OAK
Brackets and Pole Steps

LOCUST PIN COMPANY
Front Royal Virginia

1933," by Edgar Bell. Pages 1,188-94 of the August issue.

"Lightning Performance of 132-Kv. Lines," by Philip Sporn and I. M. Gross. Pages 1,195-2,000 of the August issue.

"Counterpoise Tests at Trafford," by C. L. Fortescue and F. D. Fielder. Pages 1,116-23 of the July issue.

"Field Tests on the Counterpoise," by L. V. Bewley. Pages 1,163-72 of the August issue.

Of interest not only to transmission engineers but also to the profession generally were the following papers:

"Field Tests on Conductor Vibration," by E. M. Wright and Joseph Mini, Jr. Pages 1,123-7 of the July issue.

"Corona Losses From Conductors of 1.4-In. Diameter," by J. S. Carroll, B. Couzzens and T. M. Blakeslee. Pages 854-60 of the December issue.

"Power Limits of 220-Kv. Transmission Lines," by A. A. Kroneberg and Mabel Macferran. Pages 758-66 of the November issue.

"Power Limits of Synchronous Machines," by Edith Clarke and R. G. Lorraine. Pages 780-7 of the November issue.

"Insulator Surface and Radio Effects," by W. A. Hillebrand and Charles J. Miller, Jr. Pages 1,213-20 of the August issue.

Gratifying to the regular members was the large attendance of students and the interest displayed in the excellent student program which paralleled the main technical sessions. Student activity was under the direction of Prof. J. H. Hamilton, of the University of Utah, Mr. Hamilton being assisted by members of the electrical engineering departments of other Western universities.

Tentative plans announced by the executive committee call for the 1935 convention to be held in southern California, probably at the Hotel Huntington, Pasadena.

Competition for the John B. Fisken Cup developed a keen interest in the annual golf tournament, the trophy being won by Howard Flye, manager of the Aluminum Co. of America at San Francisco. E. W. Rockwell, electrical engineer for the Metropolitan Water District, and H. M. Ferguson, guest, shared tournament honors with low gross and low net respectively.

At the banquet following the golf tournament Vice-President R. W. Sorensen awarded the 1933 technical paper prizes for District No. 8. A. A. Kroneberg and L. F. Hunt, both of the South-

Golf Committee — Left to right — B. E. Rowley, Edison G. E. Hotpoint Co.; J. A. Hale, chief engineer, and Ralph Bleak, commercial manager of the Utah Power and Light Co. and J. A. Kahn of the General Electric Supply Corp.

ern California Edison Co., Ltd., won the award for the best paper of the year; A. H. Albrecht, Standard Oil Co. of Calif., for the best initial paper; and J. H. Genzenhuber, University of Southern California, for the best student paper.

•

• QUALITY ELECTRIC CO., Ltd., Los Angeles, is constructing 83 miles of 66 kv. transmission line for the U. S. Indian Irrigation Service, between Hayden and Coolidge, Ariz. The line is to be used to serve power from Coolidge dam to the Indian Irrigation Service and will provide for about 60 wells. It will also supply power for irrigation and pumping to the San Carlos irrigation and drainage project, a reclamation project, near Hayden. The line is built on wood poles, using Pyrex glass insulators. Work is in charge of Larry Ellett, superintendent for the electrical contracting firm. It was started Aug. 6, but delayed by pole deliveries which were held up by the waterfront strike in Seattle. Over 100 miles of 11 kv. line is also to be built, from time to time, to distribute energy from this transmission line.

WHERE TO BUY . . . IN THE WEST

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Made from

Copper Bearing Steel

No known failures in nine years

PACIFIC WIRE ROPE CO., LOS ANGELES

"CRUCIBLE *Copperbond*"

GROUND RODS

Made by the "Controlled Molten Welding Process"

Easy Driving — Long Life — Copper Welded to Steel

NON-RUSTING

Fabricated in California by the Kortick Mfg. Co. from Genuine "Crucible Copperbond" Hot Rolled Rods, produced by Crucible Steel Co. of America.

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MAYDELL & HARTZELL, Inc.

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Manufacturers of

Type AEIC Service Entrance Cable

Concentrically wound bare neutral conductor, galvanized oval armor, weatherproof and flameproof finish.

For use on entrances without conduit.

Proof Against Theft of Current

Samples and prices on request.

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LOS ANGELES SAN FRANCISCO

...in Washington

TVA Financing Extends

Financing facilities of the Electric Home & Farm Authority, Inc., have been extended to include models of electrical appliances other than those approved for and bearing the TVA emblem, according to an announcement by G. D. Munger, commercial manager.

This financing service will be available for domestic electric ranges, refrigerators and water heaters. Provided a manufacturer has TVA approval on one model he may secure financing service from EHFA on all models in his line.

The anticipated announcement of the expansion of the financing service to communities outside the TVA has not yet been made.

•

• INDUSTRIAL AND UTILITARIAN LIGHTING equipment manufacturing industry, as the subdivision of the electrical manufacturing industry, has submitted a proposed supplemental code of fair competition to NRA. Hearings began Sept. 18 in Washington. The code would adopt the maximum hour and minimum wage clauses of the basic code and provides definitions of the various classifications of the trade, restricts terms of payment, restricts selling below cost and lists unfair trade practices. Trade classifications include distributors, lighting fixture manufacturers, industrial fabricators, jobbers, "electrical contractor, electrical contractor-dealer and dealer," governmental users, public utility users, industrial and commercial users, and consumers. Among trade practice provisions, besides familiar ones, are those against fraud and misrepresentation as to quality and size, threats of suit for patent or trade mark infringement, extension of warranties, splitting commissions, selling without profit to induce sales of other products, imitation of trade mark, price discrimination by split shipments, and piracy of design and construction. This code will be of importance to many Pacific Coast and Western manufacturers of industrial lighting equipment, whose business conditions have been chaotic and destructive for many years.

•

• NATIONAL ELECTRICAL MANUFACTURERS ASSN., feeling that the activities of its members touch the public in every walk of life and activity, and therefore that the industry as a whole should be understood and not misunderstood by the public has authorized the appointment by President J. S. Tritle of a publicity policy committee to study and make recommendations on this subject.

•

• NATIONAL ELECTRICAL CONTRACTORS ASSN., through the efforts of a joint committee, is working with the N.E.M.A. to obtain recognition from the manufacturers of the need for adequate compensation and protection for electrical contractors in the merchandising of electrical construction materials. The National Electrical Wholesalers Assn. is also involved in the joint effort. In a recent bulletin from N.E.C.A. significance was attached to the issuance by a manufacturer of lighting fixtures and equipment, sockets, fittings, and attachments of a new discount schedule which puts into actual effect and without reservations the principle laid down by the N.E.C.A. committee. Pacific Coast contractors, particularly in the motor section, have long been working toward the same end.

•

• PUBLIC SERVICE DIVISION, which will embrace public utilities, transportation, communication and finance, will become a new division of the National Recovery Administration as a part of its program of reorganization. This di-

A Thirty-Year-Old Plant is Restored to Modern Efficiency

Rehabilitation Costs Yield Large Return

This modern, high efficiency straight-flow nozzle, together with a runner of latest design, was practically all the hydraulic equipment needed for modernizing a thirty-year-old plant in California. From the standpoint of power output, operating cost, efficiency and safety, the modernized unit is far superior to the original installation, reconstruction costs having been comparatively insignificant.

Further details on this and other rehabilitated plants may be readily secured from Pelton engineers.

The Pelton Water Wheel Company

HYDRAULIC ENGINEERS

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PELTON

vision will embrace all of the codes comprising these various industries. Since these industries present administrative problems not common to other industries and are subject to state, federal and other regulatory jurisdiction, NRA has grouped them in one division where their problems will receive specific attention and not be confused with those of non-related industries. Complete charting of the division is contained in the Sept. 10 issue of "The Blue Eagle," NRA's official weekly newspaper.

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• LABOR provisions must be posted by employers, according to administrative orders of NRA. Likewise, orders, interpretations, explanations or statements issued by the President or administrator in connection with any order relating to labor provisions must also be posted by employers.

•

• X-RAY and electro-medical manufacturing code, a supplement of the electrical manufacturing industry master code, was given a public hearing Sept. 20 in Washington. The code, besides adopting the labor and hour provisions, sets up a price policy, restricts selling below cost, specific terms of payments, provides for resale price maintenance and contains a list of fair trade practice provisions.

•

• ARTISTIC LIGHTING EQUIPMENT manufacturing code authority presented its budget in Washington Sept. 14. The budget calls for $28,500 to support its code administration to be raised by contribution of two-tenths of one per cent of gross sales of industry products, to be billed monthly and based on sales of the second preceding calendar month. This code affects a great many local manufacturing concerns making artistic and domestic home lighting equipment in the West.

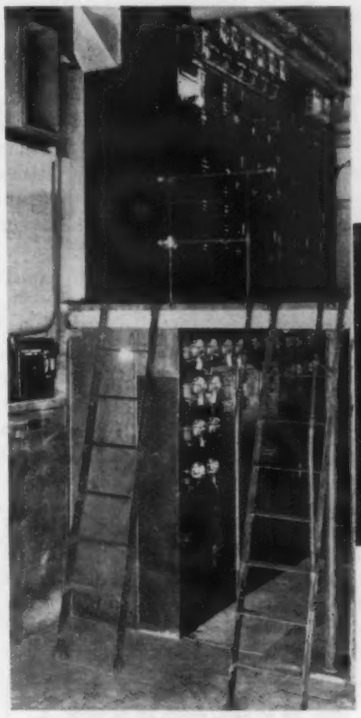
•

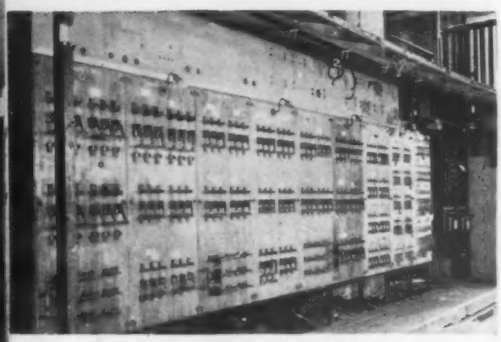
• RADIO WHOLESALING TRADE code is being amended to increase the code authority for the radio wholesaling trade from 12 to 19. One non-association member and six association members will be added in various geographical sections of the country. This will probably mean more representation for Western sections.

•

• ELECTRIC AND NEON SIGN industry had its code approved Aug. 24. Not under any of the basic codes the code is for this group alone. Forty-hour week with $16 minimum wage, (40 cents per hour) and 45 cents per hour for part-time employees, are required. The code authority will consist of twelve members. Art. 7 provides for cost finding and accounting; Art. 8, open price provisions similar to the electrical manufacturing code. Usual fair practice requirements are included. Among these are: a rule relating to copying or piracy of design; another to removal of name of manufacturer, unauthorized use of insignias, trade marks or designs; and one against reduction of bid without changing the specifications or plans justifying such reductions. This code will affect many local and regional sign manufacturers in the West.

• BONE BILL UP AGAIN—Power will be an issue in the Washington state campaign in November. U. S. Senator Homer T. Bone has announced that he will campaign in behalf of the bill bearing his name which permits municipal power plants to extend their distribution systems outside their corporate limits. This bill was defeated by a popular majority of 70,000 votes in 1924. In 1933 the measure was passed by the Washington legislature but was again referred to popular vote by the filing of a referendum petition.





SQUARE D
ELECTRICAL EQUIPMENT

Twice the Control in ¼ the Space

Into the new installation for the U. S. Grant Hotel in San Diego, went not only a Square D switchboard, but a man-sized Squard D engineering job. In the engine room of this noted hostelry was a 35′ x 10′ switchboard, the first unit of which was installed in 1910. Power additions were made in 1916 and numerous others at later dates. Here, when Square D men arrived, was a switchboard, combining a hodge-podge of power and light controls, of the open type, hazardous to both life and property and utterly impossible to maintain in good working order.

In the boiler room Square D engineers could utilize but ¼ of the space for the new switchboard! But in it went—a brand new Square D board, only 8′ x 12′. Built in two tiers, one above the other, one tier for the light board and one for the power board, Square D Saflex units saved 154 square feet—¼ the size of the old space and with positive control for both power and light!

The combined number of switches installed on these two boards totaled 128, ranging in size from 30 Amps. to 400 Amps., with provisions for separate meters to each of 19 departments, in addition having a master recording meter.

Throughout the eleven Western States, Square D is not only installing switchboards and other electrical equipment, but is meeting engineering problems involved in these installations with the same capability, efficiency and flexibility as is embodied in its electrical products.

"CALL FOR A SQUARE D MAN"

SQUARE D COMPANY
ELECTRICAL EQUIPMENT INC.

1320 East 16th Street • Los Angeles, Calif.

SQUARE D SWITCHBOARDS

Court Rules Ability to Pay Not Major Factor in Rate Making

Orders of a three-judge federal court, filed August 30, have stopped the state of Utah, Governor Henry H. Blood and the public utilities commission from reducing telephone rates in Logan, and electric power rates in the territory served by the Telluride Power Co. Arguments on injunctions brought against orders of the commission were heard in Salt Lake City last June before the federal court, with three judges, and written opinions in both cases are given with all three judges concurring.

The commission had ordered a reduction of 10 per cent in light and power rates by the Telluride company because of the depression and the drouth on the theory that the ability to pay and value of the service can be used as factors in rate making, and that the order would preserve the property by saving the customers and continuing the tenure of the land.

During the hearing, the assistant attorney general admitted that the company had earned in the past five years only 4.08 per cent on the allowed value of the property, and that if the 10 per cent reduction were in effect the company would have earned in the last year only 1.2 per cent on this value.

Judge Lewis, of the federal court, said that no decision of the U. S. Supreme Court has held that customers' ability to pay rates or that value of the service to customers is a paramount or controlling issue. "If rates are so low as to be confiscatory of the utility's property, they are condemned by the fourteenth amendment to the constitution," the federal judges held.

A fundamental distinction is pointed out between this and recent supreme court cases. Where a utility attempts to impose on customers of today a plant in excess of the need, or of excessive cost, then the factors of ability to pay and value of the service may be argued, it was held.

If on a true value of property used in public service a greater rate is returned than for other property of equal risk, rates should be decreased, the court agreed. In this case the assistant district attorney argued that farm and other property was earning nothing and going behind on fixed charges. However, the opinion definitely states that the limit of reduction of rates is the point of confiscation. The reduced rates would not yield a return to pay interest on first mortgage bonds and would be confiscatory.

The order in the power case was temporary pending a complete investigation of all rates in the state, which is now in progress. The state is enjoined from enforcement of the commission's order until a final order is made.

•

Burbank Breaks With Edison Co.

Right of the Southern California Edison Co. to operate in the City of Burbank, Calif., has been challenged by the city council on the grounds that the company has violated its franchise agreement. Burbank operates a municipal system which is in competition with the private utility.

In a resolution passed by the council, the city declares that the Edison company has forfeited its right to do business in the city and at the same time demands that the company immediately remove its equipment from the streets and cease to do business.

Principal item of controversy is the payment of franchise taxes. Also, the city is proceeding through condemnation in an effort to take over certain portions of the Edison distribution system.

•

• B. C. TO REGULATE UTILITIES—The creation of a Public Utilities Commission in British Columbia, backed by a strong public utilities act, is planned by the provincial government for presentation at the next session of the legislature in 1935. A careful study of public utility legislation in effect in all parts of America is being made prior to the drafting of the act.

•

• D. G. KENDALL, for several years with Diamond Electrical Manufacturing Co., predecessor of Square D. Co., Inc., in the San Francisco territory, and more recently manager at Denver, has been transferred to Los Angeles where he will have charge of the Square D. switchboard and panelboard department. A. M. Campbell will take over the management of the Denver plant.

Chromalox Super-Speed

Range Replacement "Top Burners"

Sizes to fit all makes of Electric Ranges

Makes old ranges cook as fast as latest 1934 models

EDWIN L. WEIGAND CO.
PITTSBURGH, PA.

Quick Shipments from Direct Factory Representatives in the West

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THE PETERSON COMPANY
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84% LIGHT OUTPUT★

S & M "Red Cap" Flood-Lites lead the Western Field in PERFORMANCE • SALES • PROFITS

● S & M No. 400 and No. 800 Series "Red Cap" Flood-Lites, constructed of spun aluminum and finished with the special "ILLUMINOUS PROCESS", are unsurpassed for efficiency, durability and utility.

For any job of exterior or interior lighting, up to 200 watts, there is one of these Flood-Lites especially adapted for the purpose.

The No. 800 Series Flood-Lites, designed for 150 or 200 watt lamps, have a reflector 9½" in diameter and a beam spread of 110 degrees. The No. 400 Series is for 50, 60, 75 or 100 watt lamps with a reflector 7" in diameter and beam spread of 120 degrees.

No. 402—With adjustable bracket, cord and plug..... $2.95
No. 403—Same as No. 402, but with clear plain lens... 4.95
With colored lens: Red, Green, Blue or Amber. 6.70
No. 802—With adjustable bracket, cord and plug..... 4.50
No. 803—Same as No. 802, but with clear plain lens... 7.40
With colored lens: Red, Green, Blue or Amber. 9.65

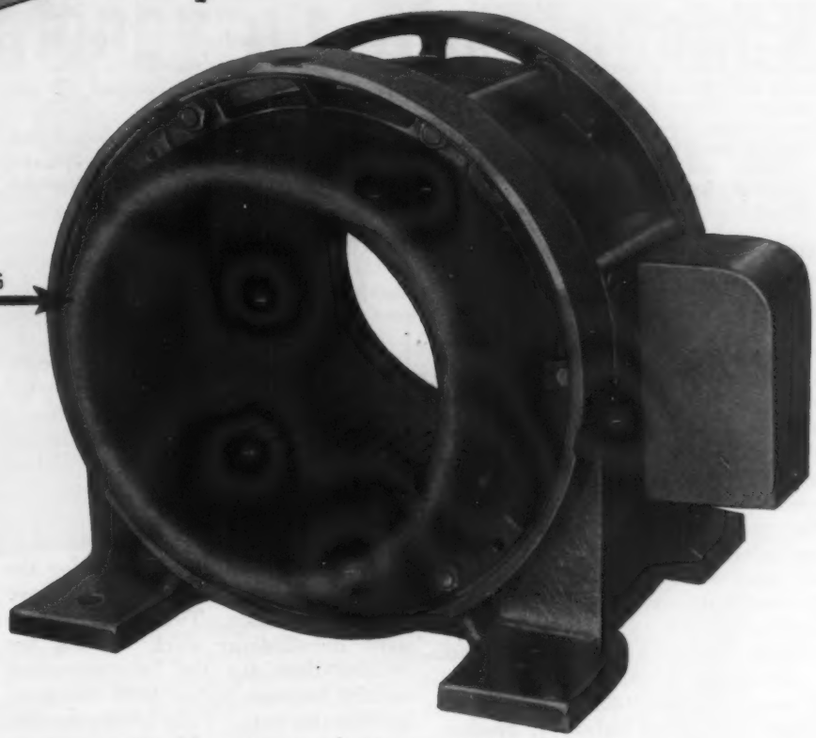
S & M manufactures a complete line of open-face and closed-type Flood-Lites for recreational and commercial use. Our engineering department is at your service without obligation.

★ Test by Electrical Testing Laboratories for S & M No. 802. ETL test charts of other "Red Cap" Flood-Lites available on request.

S & M LAMP CO. *For detailed information, write today for Catalog No. 18* **Los Angeles**

Seal-clad Motors

MOULDED BAKELITE SHIELDS
PROTECT THE WINDINGS



CONSTRUCTION FEATURES

Frame—cast steel with feet cast integral.

Stator Core—twistless, distortionless, and self supporting.

Stator Windings—Seal Clad; mechanically protected from dust and moisture.

Rotor—indestructible; bars silver brazed to end rings.

Ball Bearings—mounted in dust tight cartridges.

Sleeve Bearings—sealed enclosure prevents entrance of dust and dirt and escape of lubricant.

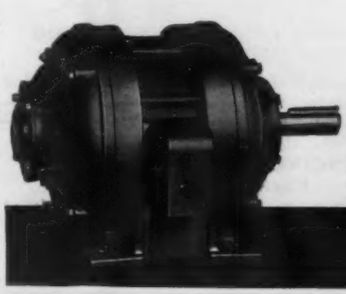
Permanent Coil Protection

WITH the new Seal-Clad construction, introduced by Allis-Chalmers, induction motors are now provided with hard, smooth Bakelite shields sealed over the stator coils, giving protection against damage from metallic dust, grit, oil, moisture, mild acids and other agents injurious to insulation.

SEAL-CLAD motors are of the open type and are built in ratings up to 25 hp, 1800 rpm.

See nearest Allis-Chalmers district office or write for Leaflet 2182.

ALLIS-CHALMERS MANUFACTURING COMPANY
MILWAUKEE, WISCONSIN



ALLIS-CHALMERS
SEAL-CLAD MOTORS

...in Western Business

Editor's Note: Because many factors influence the output of electric power and the sales of electrical appliances, apparatus and supplies, ELECTRICAL WEST *will carry as a regular feature a page summary of conditions in various industries whose business conditions directly and indirectly affect the electrical industry. These reports are compiled from reports from banks in the principal Western cities, our own correspondents, and reports of the Twelfth District Federal Reserve Agent.*

General

August indices for the Far West in most lines showed an upward trend which contrasted with those for the United States as a whole. Increased purchasing power of the farmer in this territory, who was little affected by the drouth, coupled with a resumption of activity in many lines crippled by the strikes during the preceding three months were responsible for this improvement. Canneries, lumber, flour mills, power output and department store sales showed specific gains, in many cases contra-seasonal.

General business activity for the Pacific Coast as indicated by the index of the Wells Fargo Bank & Union Trust Co. (developed by Douglas G. McPhee and based on the 1923-25 composite, weighted average of industrial production, freight carloadings, bank debits and department store sales) arose during August to the highest point since October, 1931. It stood at 74.3 per cent compared with 72.5 per cent for July and with 67.9 per cent for August last year.

Agriculture

Bumper grain crops unaffected by drouth, smaller fruit crops and higher prices place the Western farmer in an enviable position this year. The Northwest wheat crop exceeded earlier estimates by more than a million bushels, with most other sections of the country suffering acute shortages. Prices of farm products in August were at 87 per cent of the 1909-1914 average—9 per cent higher than for a month earlier and 21 per cent higher than in August, 1933. Prices are increasing. California and Arizona cotton crops are higher in quality and prices are at a level 40 per cent higher than a year ago. Fruit crops were spotted, some larger and some smaller, but in practically every instance prices are better. Shortage of feed and water affected the cattle industry unfavorably but the slaughtering necessitated by the drouth in the Middle West will mean higher prices for Western stock in the Spring. The Farmer's purchasing power, by and large, should make him a better prospect for all kinds of electrical services.

Industry

Industrial employment and payrolls regained the losses brought about by labor troubles. In California the index is at 83 per cent of its 1923-25 average compared with 62 per cent in March, 1933, the depression low. In Oregon employment increased 25 per cent from July to August.

LUMBER: Douglas fir operations, sharply curtailed during the water transportation tie-up, doubled in volume during August. Western pine production increased seasonally. Shipments and orders have expanded sharply. Production was at 52 per cent of the 1923-25 average. Peak point for 1934.

PETROLEUM: Compliance with code regulations reduced both daily average output at the wells and also refinery operations during August. Inventories are being reduced gradully. Gasoline prices fell in northern California and the Pacific Northwest.

CONSTRUCTION: Public works construction contracts for August for the Twelfth Federal Reserve District were 16 million dollars. Two-thirds of these were for Federal work. Totals are smaller than for the two preceding months but are higher than the average for the year. Private construction increased slightly. Alterations and repairs accounted for most of the total. With the Home Modernization program beginning to reach its stride, considerable improvement in this field is anticipated.

MINING: Operations in the precious metal mining regions continue to show the impetus given by the Federal money policies. Gold and silver mining operations are developing power load and equipment sales, with several new projects being considered. In the Rocky Mountain region mining has greatly stimulated business. Aside from gold and silver, however, higher prices are necessary before marked improvement will develop, particularly in the case of copper, lead and zinc.

Trade

Retail and wholesale sales increased more than seasonably in August. Greatest improvement was in San Francisco, central California, Portland and Spokane. Greatest increase was in furniture sales, August showing a 28 per cent improvement over a year ago. In San Diego the return of the U. S. fleet and the over subscription of a fund to finance the California-Pacific International Exposition in 1935 are healthy factors. In Spokane mining and government construction activity have filled office buildings and vacant homes.

In wholesale lines unusually large increases in sales were shown in dry goods, shoes, furniture, groceries and hardware. Electrical supplies showed an increase of 6 per cent over July and 22 per cent over August, 1933.

Future

Politics, both national and local, cast a cloud over a picture of Western business that otherwise is bright with prospects. Many plans are being written on a "subject to change without notice" basis. The gubernatorial race in California has not as yet shown the certain winner. Unique and fantastical legislative proposals and candidates with platforms that approach Heaven as a limit must be eliminated in November before accurate predictions are possible.

•

• BEACON ELECTRIC CO. recently moved from 506 Thirteenth St. to a new office at 609 New California Bldg. in San Diego.

PROFESSIONAL SERVICES

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FRANK ANDREWS
MECHANICAL AND ELECTRICAL ENGINEER
Specializing Industrial Plant Problems
Power Rates and Disputes
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ENGINEERING & MANAGEMENT CORPORATION
Wholly-owned Subsidiary of
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Electrical Photometrical, Chemical and Mechanical Tests. Inspection of Materials and Apparatus at Manufactory
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Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.
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One of *many reasons*

Why G-E Power Transformers Save You Money on Maintenance

The New Round-Tube Radiator Construction Costs Less to Maintain

HOW is it, you ask, that a comparatively simple part, like a radiator, can reduce power-transformer maintenance costs? Here, in a few words, are the reasons:

1. The tubes and headers, made of rust-resisting copper-bearing steel, have considerably thicker walls than those used in radiators of conventional types. The tubes are swaged at each end, reducing the diameter and providing additional thickness at the points of welding—greater strength, greater resistance to damage.
2. All welds are external and are easily repaired if the radiator is damaged.
3. Only one-third as many gasketed joints are required with this construction.
4. All surfaces of the headers are sloped to shed water. There are no recesses or pockets that would hold moisture or dirt.
5. Inspection, cleaning, and painting are made easier and quicker by the relatively large spacing between the tubes and the accessibility of all surfaces. There are no sharp edges or crevices.
6. To prove oil tightness, each radiator is tested with gas at a pressure of 80 lb. per square inch.

The G-E round-tube radiator is not only strong and efficient, but it has done away with the troublesome features of older types.

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

Details of radiator and radiator valves.

310-2

GENERAL ELECTRIC

...about People

• C. J. GALLOWAY has been placed in charge of merchandise promotion in the commercial department of the Washington Water Power Co. For the past twenty years he has been engaged in merchandising activities in Spokane stores, being for three years manager of the Palace Department Store and for

C. J. GALLOWAY

the past eighteen months merchandise supervisor for Sears-Roebuck in the Portland, Seattle and Spokane stores. According to Lewis A. Lewis, assistant general manager in charge of sales, Mr. Galloway will devote his entire time to working with dealers of electrical appliances throughout the territory served by the company in an effort to promote sales.

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• BEN W. FABER has been appointed agricultural engineer of the Portland General Electric Co. in its Tualatin Valley division. Prior to coming with the company he had five years experience with the Westinghouse Electric & Manufacturing Co. in rural electrification work and was for a time rural specialist for the Northern Pennsylvania Power Co. He also has had practical Western farm experience.

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• RAY W. TURNBULL, assistant appliance sales manager, G. E. Merchandise Department, Bridgeport, Conn., is spending some time on the Pacific Coast conducting a series of meetings on the company's new plans and new ideas in retail electrical merchandising. For many years Mr. Turnbull was Pacific Coast manager of the Edison General Electric Appliance Co. before going east four years ago. He was accompanied by John M. Wicht, manager of home laundry equipment sales from Bridgeport, who assisted in the meetings.

• F. E. Ross, young in years but with extended experience in both the utility and the advertising field, has just been named assistant to Thomas Fulford, general sales manager of the Puget Sound Power & Light Co. Mr. Ross formerly was assistant to Sales Manager Glenn Jackson of the California-Oregon Power Company at Medford, Ore. He left there to enter the employ of the Strang & Prosser Advertising Agency at Seattle, where he assisted in handling utility advertising and merchandising campaigns. Mr. Ross now spends much of his time inspecting and supervising the merchandising activities of the company throughout its territory in western and central Washington.

•

• BILL POWELL, formerly manager of the Phoenix, Ariz., branch of the General Electric Supply Co., is now with the San Diego branch of that firm, according to Frank Munroe, manager at San Diego.

•

Joins Square D

J. H. Jamison, for many years a member of the merchandise department of the Westinghouse company in southern California, has joined the Square D Co., Inc., as special agent. At present he is making a survey of the Northwest territory. According to Vernon Brown, president, he later will be placed in charge of sales in southern California or will assume the management of one of the Square D branch factories.

• LEO GIANINI, Incandescent Lamp Department, and Karl Koch, of the street lighting department, both of General Electric Co., demonstrated the new mercury high-intensity street lamps at the Sept. 7 meeting of the Illuminating Engineering Society, San Francisco Bay Cities Chapter. Mr. Gianini also reported on lighting improvements at the World's Fair at Chicago. He told of the sales meeting at Cleveland which he attended and demonstrated a new portable lighting demonstration kit, a "lighting sales laboratory," which any man can carry around easily with him. Officers nominated for the chapter at the previous meeting were elected. Mr. Gianini will become president next year.

• W. WESLEY HICKS and ARTHUR KERCHER, of Wesix, Inc., recently returned from an extended trip through the Muscle Shoals territory. They were guests of Arthur E. Morgan, chairman of the board of the Tennessee Valley Authority.

•

• L. P. MONTI, associate engineer, has been placed in charge of the San Francisco office and testing station of Underwriters' Laboratories. Offices of Underwriters' Laboratories also have been moved from 1014 Merchants Exchange Building to 615 Commercial Street. Herbert G. Ufer will continue as Western superintendent, with headquarters in Los Angeles.

•

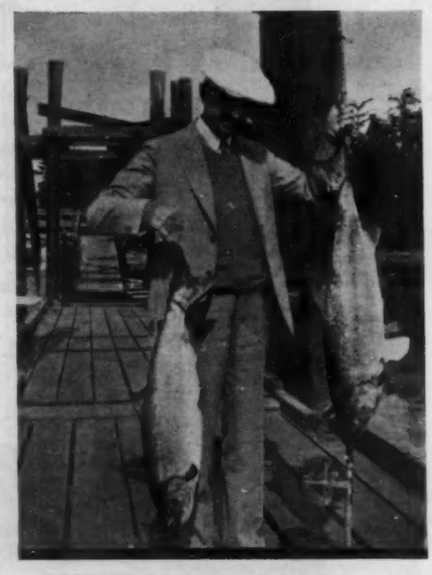
• FRED STAIBLE has been appointed representative of the floodlight division of the S & M Lamp Co. in the Denver territory. Harry Tanner will continue to represent the automotive division. William Bracken and James Dieffenwierth have been added to the S & M Lamp Co. sales staff in southern California.

•

• F. D. WALLACE, formerly with the Thor-Pacific Co. in Los Angeles, recently has been appointed southern California district manager of Altdorfer Bros. Co. with offices at 316 Commercial St., Los Angeles.

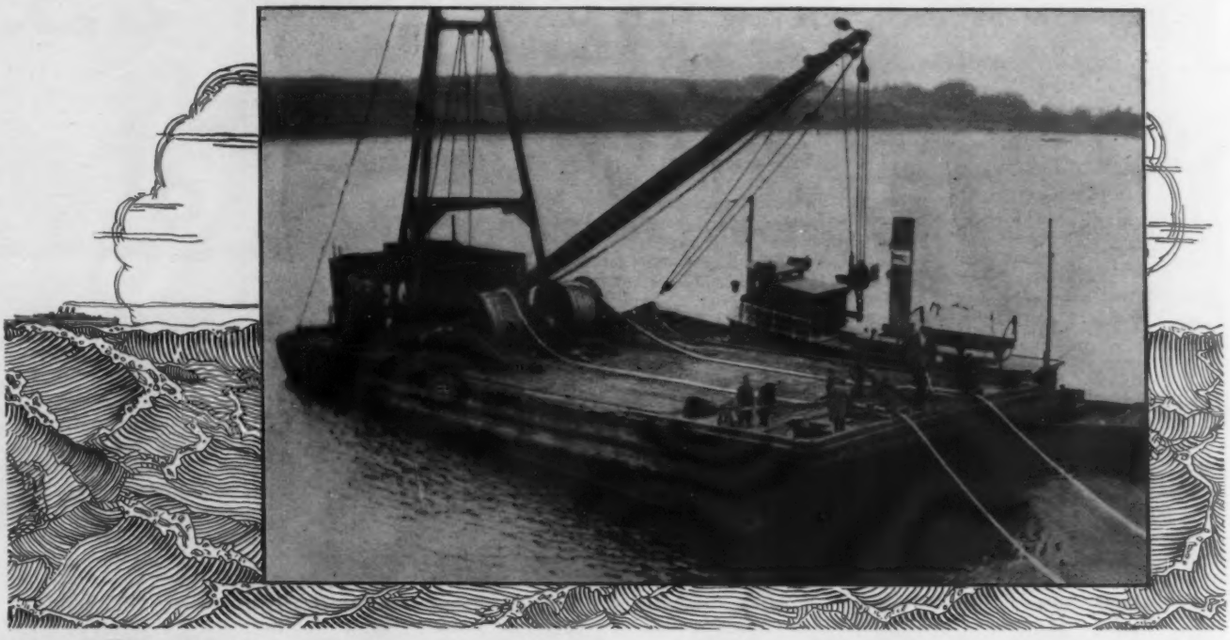
•

Prize Fisherman



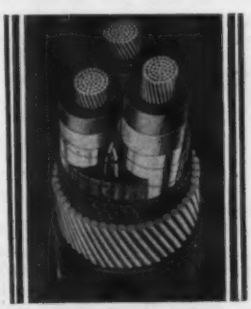
Fred B. Lewis, vice-president and general manager of Southern California Edison Co., had the fishing bug bite him during a recent trip to Vancouver Island. His success earned him the coveted bronze button of the Victoria Sannich Inlet Anglers Association for capturing a 22½-lb. salmon on light tackle. Not even some of the industry's most ardent anglers have been able to equal this achievement

IN SUBMARINE CABLES



IT'S WHAT HAPPENS UNDERNEATH THAT COUNTS

AFTER all has been said and done—and after all the laboratory tests and formulae have been made and studied—there is only one unfailing method of determining which submarine cable will serve better and last longer. In the final analysis—**it's what happens underneath that counts. American Steel & Wire Company Leadless Submarine Cables** offer many technical advantages—and, in addition, have definitely demonstrated their superiority under many and varied conditions of usage. There are many vital performance and economy reasons why you should specify them—reasons that we will gladly forward to you on request.



1831

1934

AMERICAN STEEL & WIRE COMPANY

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

Pacific Coast Distributors

COLUMBIA STEEL COMPANY

SAN FRANCISCO LOS ANGELES PORTLAND SEATTLE

...in New Equipment and Appliances

Foolproof Auto Starter

Automatic motor starters, which positively prevent accidental starting and which permit taking full advantage of a motor's capacity without danger of burning it out, have been placed on the market by the Lincoln Electric Co., Cleveland. The starter is of the across-the-line type. Due to design it is impossible to close the starting current unintentionally. The red stop button extends around and beyond the green start button. Consequently, a bump or a fall against the control would move only the stop button. Once the motor is stopped, the only way it can be restarted is by pressing the recessed start button with the fingertip. Full advantage of the motor's capacity is permitted by an inverse time limit protection which allows carrying a small overload a long time or a very heavy load a short time. The new starters are furnished in three types for various horsepowers and 110, 220, 440 and 550 volts.

●

Oversize Fiberduct

New product of the General Electric Co.'s Merchandise Department, Bridgeport, Conn., is a super "Fiberduct" raceway for underfloor wiring, introduced to provide greater wiring capacity for such installations as the laboratories and shops of high schools and technical schools. The new oversize raceway has a cross-sectional area of 5 sq .in. and accommodates 144 pairs of No. 22 twisted wire. It is of the oval-top and closed-bottom type.

●

Miniature Switchboard Meters

Intended primarily for power station miniature switchboards, supervisory control and similar applications, a complete line of small indicating meters in rectangular cases known as Type K has been placed on the market by Westinghouse Electric & Manufacturing Co., East Pittsburgh. Noteworthy is the fact that the movements are the same as those in the larger Westinghouse instruments, yet the cases are only 4x4¼ in. over all. Dials are illuminated by means of concealed miniature lamps and the cases are of the flush mounting type. Construction is such that the mechanism can be removed from the front of the panel.

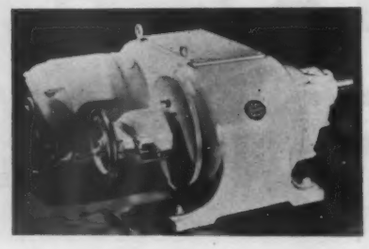
Oilproof Conductor

Oil-proof "Okocord" is the designation of a new type conductor which will not be affected by exposure to gasoline, oil or grease just placed on the market by the Okonite Co., Passaic, N. J. This is a Thiokol-sheathed portable cord insulated with Okonite. This new conductor is similar to standard "Okocord" except that the belt is a synthetic compound consisting of Thiokol mixed with a small percentage of rubber and other ingredients. An open-mesh seine twine braid, treated to protect it from moisture, is imbedded in the belt in order to reinforce the sheath and to prevent kinking. The conductor is available in single or multiple types, the latter with different colored insulations to indicate polarity.

●

Outdoor Time Switch

Adapted to outdoor as well as indoor installation, a new socket-mounted time switch for off-peak control of water heaters has been announced by the General Electric Co., Schenectady. Designed as Type T-11S, it is so mounted that it can be plugged in a standard socket meter base. It is intended to meet the requiremnets of off-peak water heating control where metering is done outdoors. Used in combination with standard outdoor or indoor metering devices, it is protected by a glass cover and sealed to the socket meter base into which it is plugged. The time-keeping element is a Telechron motor which operate without the usual problems of regulation.



Multi-Speed Motor

Variations of 1, 10 or 100 r.p.m. or more are available with a new geared motor announced by the U. S. Electrical Manufacturing Co., Los Angeles. It offers any and all speeds over a wide range without intricate control mechanisms. It consists of a self-contained unit without gear changing devices embodying an electro-mechanical power conversion which changes the fixed constant speed of the motor to variable speeds at the take-off shaft. The variable speed transmission comprises dual discs coupled with a varibelt. Speed changes are obtained by varying the effective diameter of the discs. Stability and non-fading speed characteristics are advantages claimed.

●

Explosion-Proof Switch

Explosion-proof safety switches for use in Class 1, Group D hazardous locations comprise a new line announced by Cutler-Hammer, Inc., Milwaukee. It includes both single throw and double throw types, in standard sizes up to 200-amp. capacity. The switch is of heavy industrial duty Type A construction with outside operating handle mounted in a heavy weather-proof, semi-steel cast enclosure. A precision machined flange of required width between the case and cover assures proper cooling of any flame which might occur from an explosion within the case so that outside gases will not ignite. Two pipe threaded conduit holes are provided in the bottom of the case and pads at the side and top allow for drilling other holes if needed. Finish is black Japan.

Electric Outboard Motor

An electrically-driven outboard motor for light boats has been placed on the market by The Electro Co., of Long Beach, Calif. Known as the "Electro" boat propeller, the unit is powered by a full ball-bearing motor which operates on 6 to 12 volts d.c. Powered by two 6-volt heavy duty batteries, the installation will provide two speeds by wiring the two batteries in series and using one to furnish 6 volts. The motor is provided with a reversing switch. Weight 30 lb. Retail price $35.

●

Meter-Type Time Switches

"Meter" type time switches, so termed because they are mounted in Westinghouse Type CS outdoor meter cases and especially designed for off peak water heating service have been placed on the market by Paragon Electric Co., Chicago, Ill. Two series are available. In the synchronous series the time switch is the "Synchron" motor with its internal gear reduction sealed in a dust-tight die casting containing perpetual lubrication for the life of the motor. A self-winding series uses a precision clock movement containing a heavy jeweled escapement equipped with a temperature compensating hairspring. Standard types are furnished with standard Westinghouse glass cover and Type S armor-mounting parts but do not include meter sockets. Thermostats and heat coils can also be furnished mounted within the assembly and are recommended for outdoor installations.

●

Range Top Cooker

Designed especially to provide a thrift cooker without depriving the range of one surface unit, a new cooker has been placed on the market by Electromaster, Inc., Detroit, Mich. It consists of an insulated outer container, a 6-quart cooking vessel, baffle and a set of aluminum cloverleaf containers. It is designed for use on a low wattage range unit (750, 150, 100 watts) which is standard equipment on some ranges and may be installed on others. The outer receptacle of the cooker is chromium plated steel. All other parts are heavy aluminum. A close fitting insulated cover is equipped with an automatic vent.

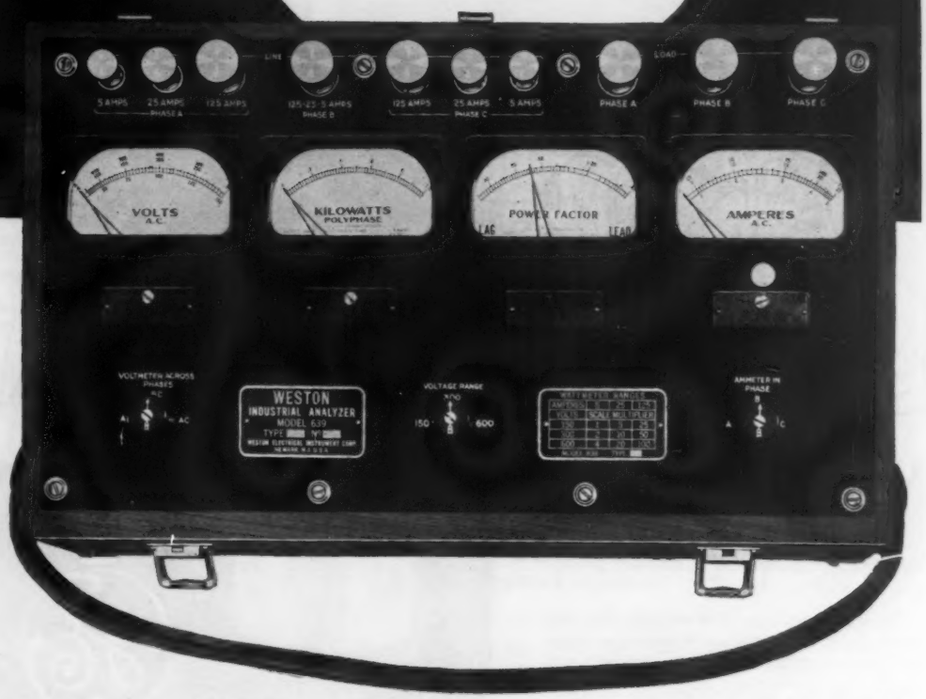
●

Modernistic Fittings

Designed to harmonize with the modern trend in office furnishings, a complete line of modernistic surface fittings or outlets for underfloor duct has been introduced by the Merchandise Department of General Electric Co., Bridgeport. Harmony in color as well as in form is made possible by the fact that green or chrome-plated outlets are available for use with similar colored carpets or chrome-trimmed furnishings. The new line includes duplex, two-pole, three-pole, twist-lock and polarity outlets. A special flange for use with carpets is designed so that it may be easily installed, without injury to the fabric, merely by separating the knap.

Announcing....

THE WESTON INDUSTRIAL POWER ANALYZER



—A SIMPLIFIED, SELF-CONTAINED ANALYZER OF ELECTRICAL LOADS

Mounted in a sturdy, portable carrying case, this new WESTON unit provides for quick and complete analysis of industrial loads. It measures current, voltage and power in single or polyphase circuits and power factor in 3-phase circuits . . . without the necessity of hooking up individual instruments. In addition, provision is made for measuring transients such as starting current of induction motors.

It's the new WESTON Model 639 Industrial Analyzer, which makes load testing quick and simple. Here's an example:

To get full line characteristics of a 3-phase circuit with this analyzer, simply hook on the three line leads and the three load leads . . . just one hook-up. With the selector switch at the left, voltage readings are obtained across any pair of the three lines, and the switch at the right connects the ammeter to read current in any one of the three . . . without in any way interrupting the operation of the circuit. That's all there is to it.

Because of its time-saving features, its simplicity and its positive indications, Model 639 is the ideal tool for plant maintenance and for servicemen and contractors. A bulletin is available with complete data. Send for a copy. Weston Electrical Instrument Corporation, 577 Frelinghuysen Ave., Newark, N. J.

WESTON *Instruments*

PACIFIC COAST REPRESENTATIVES

Eicher & Bratt,
263 Colman Bldg.,
Seattle, Wash.

C. F. Henderson,
420 Market St.,
San Francisco, Calif.

Electrical Engr. Sales Co.
Subway Terminal Bldg.
Los Angeles, Calif.

. . . and "Jake the Skeptic" cheered the loudest!

WHEN we showed the new 1935 line of G-E Washers to a group of dealers —*we started something*. Listen to this:

The shrewdest of them all, (let's call him "Jake the Skeptic"), *actually got up and cheered!*

We don't believe in boasting. But we honestly say that this new G-E line is by far the outstanding line of washers on the market. Every one designed throughout by General Electric. Every one is as silent as a kitten's purr. *Selling points?*

Read these:

(1) "One-Control" Wringers—only one control instead of the usual four or five. (2) Foot Controls—no stooping to start or stop Activator, or to pump out dirty water. (3) Temperature Control—shows when the water is right for woolens, linens, cottons. (4) The famous G-E Activator! and (5) Motors that never need oiling!

There are many other points . . . but the important thing is *here are washers you can sell*—whether you're located in big town or small town—whether you're a big dealer or a small one *you can sell them*. Most surprising of all, they cost not one penny more than ordinary washers—$49.50 to $149.50 (Eastern Suggested List Price). Prices slightly higher west of the Rockies.

Our "Ring the Bell" campaign is just off the press. It tells you how to find prospects—and how to SELL them! It begins September 15th so write for it *NOW!* Only G-E dealers can get it.

2 Beauties in the new G-E 1935 Washer line

GENERAL ELECTRIC WASHERS

Clip this Coupon
Section H339

Mr. J. M. Wicht
Mgr. Home Laundry Equipment Sales
General Electric Co., Bridgeport, Conn.
I want the facts about:
1. The New G-E Silent Line
2. The "Ring the Bell" Fall Campaign

Name_____

Address_____

City_____ State_____

WHERE TO BUY IT IN THE WEST

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Frigidaire Corp.
General Elec. Co.
Graybar Elec. Co., Inc.

Anchors, Guy
James R. Kearney Corp.

Appliances, Household
Apex Rotarex Mfg. Co.
Chicago Flexible Shaft Co.
Easy Washing Machine Corp.
Edison Gen. Elec. Appliance Co., Inc.
General Elec. Co.
General Elec. Supply Corp.
Graybar Elec. Co., Inc.
Lindemann & Hoverson Co., A. J.
Malleable Iron Range Co.
Mary Dowd Reardon Studios Ltd.
One Minute Washer Co.
Panama Lamp & Com'l Co.
Swartzbaugh Mfg. Co.
Westinghouse Elec. Supply Co.

Boxes
General Cable Corp.
General Elec. Co.
Russell & Stoll Co.
Thomas & Betts Co.

Brackets, Wood
Locust Pin Co.

Bus Fittings
Burndy Eng'g Co.
General Elec. Co.

Cables Accessories
General Cable Corp.
General Elec. Co.
John A. Roebling's Sons Co.

Cables
American Steel & Wire Co.
Columbia Steel Co.
Crucible Steel Co. of America
General Cable Corp.
General Elec. Co.
Graybar Elec. Co., Inc.
Maydwell & Hartzell, Inc.
Providence Insulated Wire Co.
John A. Roebling's Sons Co.
Westinghouse Elec. & Mfg. Co.

Carbon Brushes
National Carbon Co., Inc.

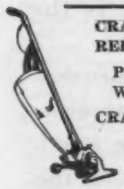
Carbon Products
National Carbon Co., Inc.

Central Station Equipment
Tom Wood

Chimes
Square D Co., Inc.

Circuit Breakers
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Cleaners, Vacuum
Apex Rotarex Mfg. Co.
Clements Mfg. Co.
Cramer Elec. Co.



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Parts for all makes
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Steel & Tubes, Inc.
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Fire Proof Wall Co.
Johns-Manville Corp.

Connectors
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Cutouts
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General Elec. Co.
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Demand Control
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Wesix, Inc.

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General Elec. Co.
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St. Louis Malleable Casting Co.
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Electrodes, Arc Welding
John A. Roebling's Sons Co.
General Elec. Co.

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General Elec. Co.

Fittings, Conduit
General Elec. Co.
Steel & Tubes, Inc.

Fixtures, Lighting
General Elec. Co.
Russell & Stoll Co.
Smoot-Holman Co.
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Floodlighting
General Elec. Co.
S & M Lamp Co., Inc.
Smoot-Holman Co.

Fuses
Trico Fuse Mfg. Co.

Gasoline
Union Oil Co.

Generators
Allis-Chalmers Mfg. Co.
General Elec. Co.
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Graphite Products
National Carbon Co., Inc.

Ground Rods
Crucible Steel Co.
Maydwell & Hartzell, Inc.

Heaters, Air
Edison Gen. Elec. Appliance Co.
Montgomery Bros.
Noblitt-Sparks Industries, Inc.
Sandoval Sales Co.
Thermador Elec'l Mfg. Co.
Wesix Inc.
Edw. L. Wiegand Co.

Heaters, Water
Edison Gen. Elec. Appliance Co.
Lindemann & Hoverson Co., A. J.
Malleable Iron Range Co.
Red Spot Elec. Co.
Sandoval Sales Co.
Thermador Elec'l Mfg. Co.
Wesix Inc.
Westinghouse Elec. & Mfg. Co.

Heating Element—Repair Part
Mend-It Sleeve Mfg. Co.
Edw. L. Wiegand Co.

Illuminating Glassware
Inland Glass Works, Inc.

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Air Heaters and Thermador - Everhot Water Heaters
"Seven Leagues Ahead"
THERMADOR ELECTRICAL MFG. CO.
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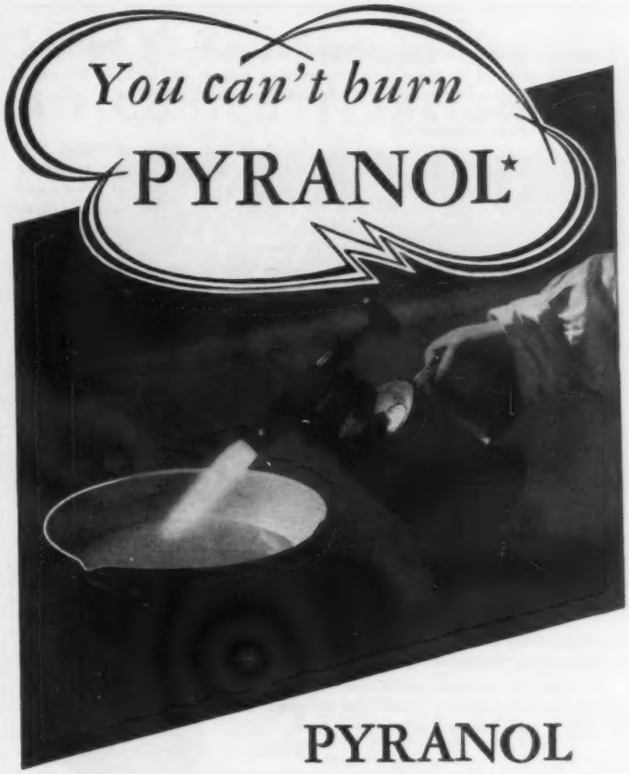

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THAT'S WHY G-E *Pyranol Capacitors are SAFER*

IN addition, Pyranol is superior as a dielectric to anything that has yet been developed; this produces a long-lived capacitor.

Thousands of G-E capacitor units are purchased every year by industrial users of power. Public utilities can recommend G-E Pyranol capacitors to their customers with assurance that the capacitors will give long-time satisfaction.

NOTE: Why not use them yourself? A capacitor is a simple, convenient, economical means for increasing the capacity of generators and feeders. A small investment may bring big returns.

★Pyranol is a trade-mark of the General Electric Company.

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY
Department 6E-201, Schenectady, N. Y.

Please send me a copy of your practical bulletin *Improving Power-factor for Profit*, GEA-77G.

Name.....

Firm.....

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., required by the Act of Congress of August 24, 1912, of Electrical West, published monthly at San Francisco, Calif., October 1, 1934.

State of California, } ss.
County of San Francisco }

Before me, a notary in and for the state and county aforesaid, personally appeared G. C. Tenney, who having been duly sworn according to law, deposes and says that he is the Editor of Electrical West, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are:

Publisher, McGraw-Hill Company of California.....
.....883 Mission St., San Francisco, Calif.
Editor, G. C. Tenney.....883 Mission St., San Francisco, Calif.
Managing Editor .....None
Business Manager .....None
Manager.....Roy N. Phelan, 883 Mission St., San Francisco, Calif.

2. That the owners are: Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.

McGraw-Hill Company of California, San Francisco, Calif.; McGraw-Hill Publishing Company, Inc., New York City; J. H. McGraw, New York City; R. A. Balzari, San Francisco, Calif.; N. A. Bowers, San Francisco, Calif.; G. C. Tenney, San Francisco, Calif.; John W. Otterson, San Francisco, Calif.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amounts of bonds, mortgages, or other securities are: None.

GEORGE C. TENNEY, Editor.

Sworn to and subscribed before me this 26th day of September, 1934.

[SEAL] THEO. LUNSTEDT.
(My commission expires July 30, 1935.)

Where to Buy It in the West—Continued

Instruments, Measuring
General Elec. Co.
Quality Elec. Co.
Roller-Smith Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec'l. Instrument Corp.

Insulation
General Elec. Co.
Johns-Manville Corp.
C. D. LaMoree

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Corning Glass Works
Graybar Elec. Co., Inc.
Hemingray Glass Co.
Illinois Elec. Porcelain Co.
Lapp Insulator Co., Inc.
Locke Insulator Corp.
McLaughlin Glass Co.
Owens-Illinois Glass Co.
Westinghouse Elec. & Mfg. Co.

Ironers
Apex Rotarex Mfg. Co.
Easy Washing Machine Corp.
General Elec. Co.
Ironite Ironer Co.
Mary Dowd Reardon Studios
Savage Distributing Co.

Lamps, Mazda
General Elec. Co.
Westinghouse Lamp Co.

Lamps, Sun
General Elec. Co.

Lighting Equipment
Smoot-Holman Co.
Wuelker Reflector Lighting Corp.

Line Material
Maydwell & Hartzell, Inc.

Meters
General Elec. Co.
L. A. Nott
Sangamo Elec. Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec'l Instrument Corp.

Molded Material
Electrical Specialty Co. of So. Calif.
C. D. La Moree

Motors
Allis-Chalmers Mfg. Co.
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Motor Starters
Allis-Chalmers Mfg. Co.
General Elec. Co.
Ward Leonard Elec. Co.
Westinghouse Elec. & Mfg. Co.

Oil, Lubricating
Union Oil Co.

Oil, Transformer & Switch
General Elec. Co.
Union Oil Co.

Panel Boards
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Photoelectric Cells
General Elec. Co.
Weston Elec'l Instrument Corp.

Pins, Wood
Locust Pin Co.

Pole Line Hardware
General Electric Supply Corp.
Graybar Electric Co., Inc.
Hubbard & Company
Joslyn Co. of Calif.
Kortick Mfg. Co.
Locke Insulator Corp.
Maydwell & Hartzell, Inc.

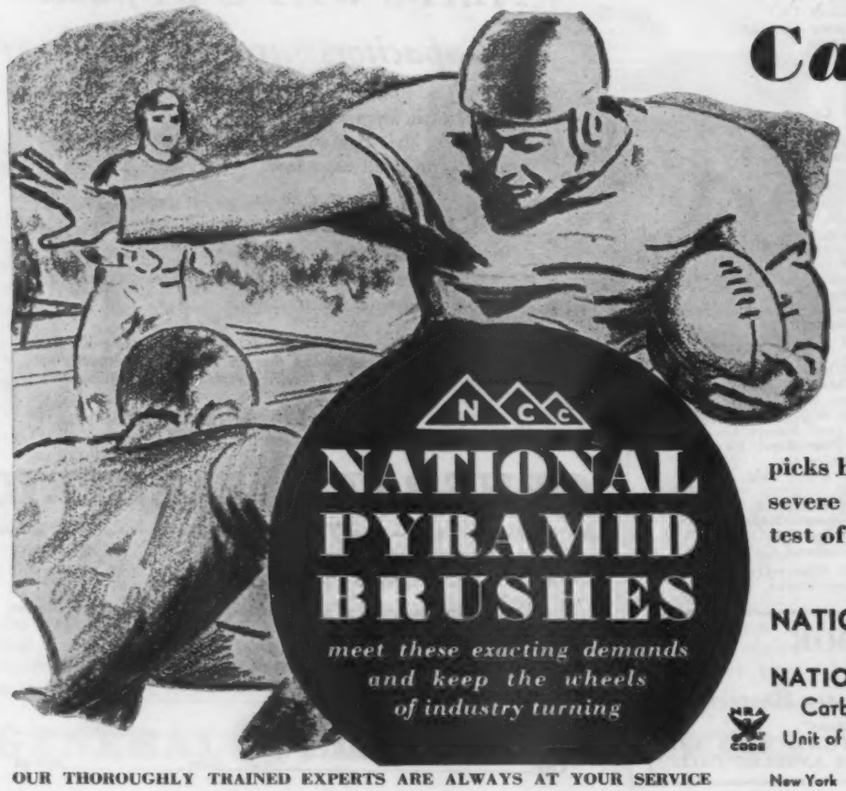
Public Address Systems
Electro-Acoustics Products Co.
Waltham, DeWitt & Krusi

Public Utilities
Pacific Gas and Elec. Co.
San Joaquin Light & Power Corp.
Southern Calif. Edison Co. Ltd.

Pumps
Pelton Water Wheel Co.

Range Units
Edison Gen. Elec. Appliance Co.
L. W. Thompson
Edwin L. Wiegand Co.

When Coaches Choose Candidates



WEIGHT, strength and speed influence the selection of the team from a large squad of candidates, but performance in the game is the final test.

National Pyramid Brushes are selected for specific applications as carefully as the coach picks his team. Performance under the severe demands of service is the final test of quality.

CHOOSE
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Carbon Sales Division, Cleveland, Ohio
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NRA CODE

OUR THOROUGHLY TRAINED EXPERTS ARE ALWAYS AT YOUR SERVICE

Where to Buy It in the West—*Continued*

Ranges
Edison Gen. Elec. Appliance Co.
General Elec. Co.
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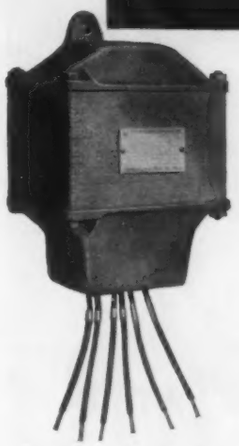

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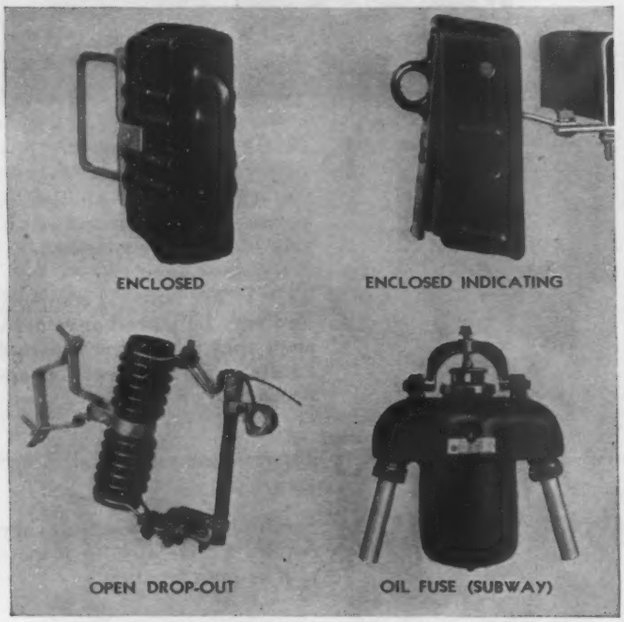
Thorough Tests Prove Their Liberal Factors of Safety to Meet the Shocks and Stresses of Service



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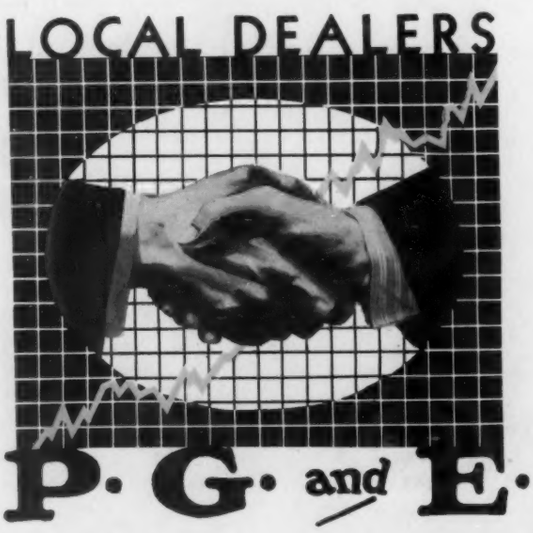

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